The Builder.

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New Premises, Bury-street.....Mr. Leslie W. Green, A.R.I.B.A., Architect.
"Ardmillan": South-East View } .....Mr. E. Turner Powell, Architect.
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Masonry Dams.

IN a "Note" in our issue of April 1 of this year we referred to the possibility that a recently-published theory relative to the stresses in masonry dams might have the effect of modifying the views hitherto entertained as to the magnitude of the factor of safety in the Assuan dam.

According to all accepted theories the factor in that structure is so very large that engineers have been quite justified in believing the existing masonry to be very well capable of withstanding much greater stresses than those now obtaining. Consequently the proposal was made last year by Sir William Garstin that the height of the dam should be increased by 6 metres, so as to provide for impounding an additional volume of 35,000,000 cubic ft. of water, thereby doubling the capacity of the reservoir at a comparatively small cost.

The new theory is to be found in a paper on "Some Disregarded Points in the Stability of Masonry Dams, by Mr. L. W. Atcherley, with some assistance from Professor Karl Pearson." Mr. Atcherley is a demonstrator in applied mechanics at University College, London, and Professor Pearson occupies the chair of applied mathematics and mechanics in the same college. Before proceeding further we may as well say that the line of reasoning followed in the paper in question is purely hypothetical, and has no particular reference to any individual dam, being intended to show that previous practice has been generally defective. We are quite ready to admit that a complete solution of the complex problem presented by the design of a masonry dam has not yet been found, owing to the inadequate knowledge of molecular statistics which at present limits the efforts of engineers. But the strength and stability of many important structures designed in accordance with accepted principles have been amply verified by the test of practical experience, and it will take something more than an abstract theory to convince engineers that they have been living in a fool's paradise.

A gravity dam, in which the horizontal thrust of the water is held in equilibrium by the weight of the masonry, is generally considered as liable to failure in one of three ways:—

(1) By sliding along a horizontal section, either at the base or at some higher level.

(2) By overturning about one end of a horizontal section, this condition being necessarily accompanied by tension at the opposite end of the same section.

(3) By crushing of the masonry at the front face when the reservoir is empty, or at the back face when the reservoir is full.

If we assume the dam to be built with a vertical front face and a plane under surface the horizontal pressure of water in the reservoir, tending to push the dam forward, is simply resisted by friction due to the weight of the masonry. Supposing water to find its way beneath the base the effective weight of the masonry will be reduced by 62·4 lb. per cubic foot, and the friction will be proportionately diminished. When dams are built on porous, sandy foundations it is necessary to provide additional resistance against sliding, either by driving piles in front of the foundation or by the adoption of well foundations or by some equivalent expedient. Treatment of this kind has been applied to the barrages at Cairo, Assiut, and elsewhere in Egypt and other countries with entirely satisfactory results. The aim should be, however, to choose a site on which the dam will be founded in solid rock, the bed being left rough or cut into serrated form, and the masonry sunk below the rock surface so as to secure a condition of fixity.

While the adoption of measures such as these may prevent the dam from sliding bodily, there may still be some risk of sliding along any horizontal section above the base. This possibility is somewhat remote if other essential points of design have received proper attention, and to the remoteness of this risk we may probably attribute the fact that no attempt has been made in the past to determine the distribution of shear on horizontal sections.

The history of the Bouzey dam, built in 1878-1880, illustrates sliding along a horizontal section where the thrust of the water was opposed by cohesion of the mortar, as well as by friction due to the weight of masonry. This dam has a

length of 1,700 ft., and is founded on sandstone of fissured and permeable character. The filling of the reservoir was commenced in November, 1881, and when the water had reached nearly halfway up springs appeared at the down-stream face of the dam, having a flow of 2 cubic ft. per second. In December, 1882, two fissures were noticed, and the discharge of the springs increased to 2·6 cubic ft. per second. Then, in March, 1884, when the reservoir was nearly full, a portion of the dam, 444 ft. in length, suddenly assumed a bent form, and the discharge of the springs increased to 8·1 cubic ft. per second. In 1885 the reservoir was emptied, and it was found that the dam had partially separated from the masonry of the foundation while still remaining vertical, the maximum down-stream movement being 1·1 ft. at the centre of the deflection. Mishaps of the kind are extremely rare, and in this case the sliding was due to defective work in addition to the effect percolation through the foundations.

To ensure stability against overturning it is necessary that the moment of the weight of the masonry should exceed the overturning moment due to horizontal pressure of the water. The thrust of the water may be considered as a single force applied at a distance of two-thirds the depth below the surface of the water. Taking the triangle ABC, in Fig.

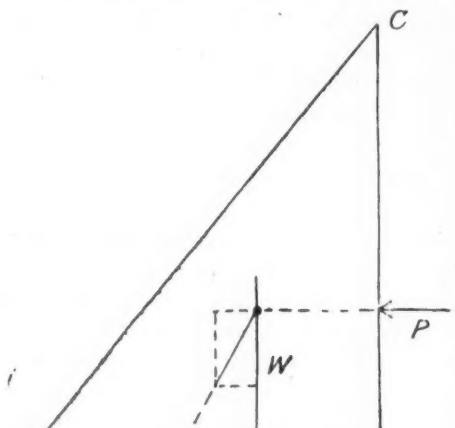

Fig. 1.

1, to represent a dam, the horizontal pressure on the face BC can be represented by the force P. The moment of this force about the point A in the base AB must be counteracted by the moment of the weight of the masonry, which can be represented by the single force W acting through the centre of gravity of the triangle, and cutting the base at *w*. Let it be assumed that the resultant of P and W cuts the base at R. Then the moment tending to overturn the dam is equal to R*w*, and the resisting moment to A*w*, the factor against overturning being A*w* ÷ R*w*. In practice the value of this factor should not be less than 2·5, and in important works should be considerably more in view of the serious consequences of failure. The relative values of the forces P and W, and the arms of their leverage, evidently depend upon the cross section of the dam and upon the height to which water is held up.

Safety against crushing of the masonry can be ensured by extending the lower portion of the dam so that compressive stress shall in no place exceed a safe limit of intensity, generally taken in this country at between 6 tons and 8 tons per sq. ft. In the case of the Assuan dam the theoretical toe pressures were limited to about 4·5 tons per sq. ft.; in the United States pressures up to 16·6 tons per sq. ft. have been permitted; and in other countries pressures of 10 tons to 14 tons per sq. ft. are by no means uncommon.

It should be noted that the maximum compressive stress occurs at or near the up-stream toe when the reservoir is empty, and, if we neglect the effect of wind pressure on the down-stream face, the only force then acting is that represented by W in Fig. 1. Conversely, the maximum compressive stress occurs at or near the down-stream toe when the reservoir is full. The horizontal thrust of the water is then added to the downward pressure of the masonry, and the actual compressive stress is due to the resultant of these two forces. Although compressive stress is calculated at the toe, and at other levels in the front and back faces of a dam, it is tolerably certain that when the batter is considerable the maximum stress must occur nearer the middle of the section. In the present state of our knowledge neither the exact value of the maximum nor the point at which it is to be found can be determined, and another unsolved problem is the effect of the horizontal component upon the vertical resistance of the masonry.

A further condition insisted upon as necessary for the stability of a dam is that there shall be no tensile stress at any part of the structure. To illustrate the manner in which tension may be established let us regard the triangle ABC,

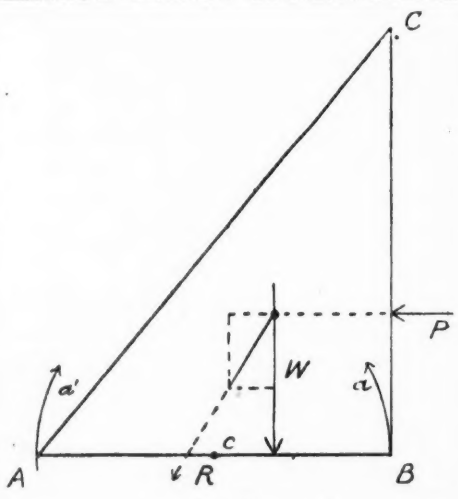

Fig. 2.

Fig. 2, as representing part of a dam, and the line AB any horizontal section. The horizontal thrust of the water above AB is represented, as before, by the single force P acting at one-third of the height BC. The effect of this force is to cause a bending moment about the centre, *c*, of the section AB in the direction indicated by the arrow, *a*, and if not counteracted this moment would result in tension at B. But the weight, W, of the masonry acting downwards through the centre of gravity of the triangle ABC has a moment of opposite direction about *c*, as shown by the arrow, *a'*. Hence, if the moment of W be greater than that of P there will be compression at B instead of tension. In the absence of water pressure, and in a dam with a cross section different from that represented in Fig. 2, it is conceivable that the moment of the weight of the masonry might cause tension at the down-stream toe. To guard against the development of tensile stress in any part of the structure the condition is made that the lines of resultant pressure for "reservoir full" and "reservoir empty" shall everywhere fall within the middle third of the cross section.

The effect of a sufficiently excessive value for the moment of P would be to overturn the whole dam, or a portion of it above the section of least resistance, and the overturning action would take place about the point A, or a corresponding point in any horizontal section above the base, because the compressive strength of the masonry would enable it to withstand stress of far greater intensity than that sufficing to pull the masonry apart at the front face.

No masonry dam designed in accordance with the principles stated above has been known to overturn bodily, and the only instance of partial failure in this way is afforded by the Bouzey dam. But it should be noted that at the period in question this structure did not comply with the requirement that the lines of resultant pressure shall be wholly within the middle third of the section. The original drawings of the Bouzey dam provided for a height of 1,187 ft. above ordnance datum. Work was commenced in 1878 and completed in 1880. During its progress the Council of the *Ponts et Chaussées* authorised the extension of the dam to the height of 1,218·5 ft. above the same level, but stipulated that the additional masonry should not be built until the first part of the dam had thoroughly consolidated. Consequently an interval of several months elapsed between the completion of the old work and the commencement of the new.

With the object of ensuring a satisfactory bond between the two portions of the work about 18 in. of the old masonry was taken down before the extension was started. After the partial failure by sliding had taken place and remedial works had been executed a portion of the dam, 594 ft. in length, suddenly overturned in April, 1895. The line of fracture was nearly horizontal longitudinally, and transversely it was horizontal for about 12 ft., dipping thenceforward to the down-stream face: Subsequent investigation showed that the fracture had occurred at the junction of the work done in the two successive seasons of 1879 and 1880. Further, it was made clear that at and for some distance above the level of 1,186 ft. the line of resultant pressure for "reservoir full" was well outside the middle third of the section. Hence the masonry had been exposed to tensile stresses which exceeded its power of resistance. This catastrophe demonstrates clearly the necessity for avoiding all risk of tension, as the previous mishap shows the importance of taking adequate precautions against sliding, especially on sites of unstable and permeable character.

Having dealt with the conditions considered essential for the strength and stability of masonry dams, and touched upon one or two points as to which existing knowledge affords little or no assistance, we will next consider the nature of the point raised in the paper by Mr. Atcherley.

Stated briefly, the contention is that, in spite of due compliance with all previously accepted conditions, dangerous tensile stresses probably exist along the base of a masonry dam when the reservoir is full. In fact, Mr. Atcherley suggests that "whether we judge by the line of resistance lying outside the middle third, or by the existence of serious tensile stresses, or by the magnitude of the mean shearing stresses, the vertical sections are critical for the stability in a far higher degree than the horizontal sections."

It is a well-recognised axiom that no masonry structure having to sustain vertical loads should have any continuous vertical joints. In a dam, where both vertical and horizontal forces have to be resisted, there should be neither continuous vertical nor continuous horizontal joints. For this reason uncoursed rubble and concrete are largely employed, with the result that the construction is practically monolithic, and may be regarded as a homogeneous elastic solid. Thus, no lines of weakness should exist in any direction, and the direction of the line of fracture must depend upon the direction of the maximum stresses causing failure. Engineers and mathematicians have always looked upon a dam as more likely to fail along a horizontal line than along a vertical line—a view to some extent confirmed by the Bouzey dam failure. Mr. Atcherley, with the concurrence of Professor Pearson, says that a dam is far more likely to fail along a vertical section. This proposition is not supported by the failure of the Bouzey dam, nor is it conclusively negatived thereby, because in that structure a horizontal line of weakness clearly existed at the junction of the old and the new masonry. The only practical evidence Mr. Atcherley can bring forward in favour of his theory is that afforded by the results of experiments with small wooden models. To this he adds a line of mathematical reasoning, which, if not strictly applicable to dams as generally built, is certainly worthy of examination.

The manner in which tension might be developed on vertical planes is shown diagrammatically in Fig. 3. Let ABC be the profile of a dam simply supported upon a flat surface of rock, DE any vertical section, and S a force representing the reaction of the rock supporting the length, AD, of the base. Then S will cause a bending moment about *c* the centre of the section DE, tending to develop tension at D. But the moment of the weight, W, of the masonry triangle ADE will oppose the moment of S, and additional opposition will be offered by tangential forces—here represented by the single force T—resisting the sliding of the dam in a down-stream direction. It is evident that if the moment of S be greater than the sum of the moments of W and T the resultant stress at D will be tension, and if of sufficient intensity this might cause failure along DE, in spite of the fact that the usual conditions

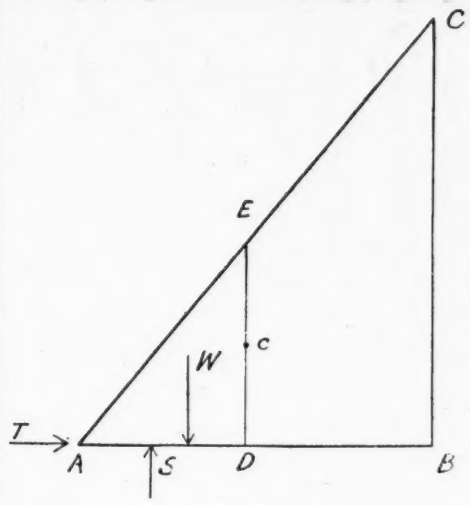

Fig. 3.

of safe design had been fully complied with. On the other hand, if the sum of the moments of W and T be greater than the moment of S the resultant stress at D will be compression, and failure could not occur along the vertical section DE, as suggested by Mr. Atcherley.

The values of S and W are readily ascertainable, but until quite lately no method has been devised for determining the distribution of tangential stresses along a surface such as AB, which may be the base as here assumed, or any horizontal section of the dam.

Mr. Atcherley has assumed the distribution of shearing stress to be parabolic, as in a rectangular beam subject to flexure, but it is doubtful whether the diagram of shearing stress has any such form, and until this question has been definitely settled, the conclusions he has drawn cannot be accepted as correct.

Professor Unwin has now propounded a method for determining the distribution of shearing stresses along a horizontal surface as AB, Fig. 3, but which is not the actual base of the dam. This method has the advantage of simplicity, and is based upon recognised mechanical principles. Therefore the results obtained by its aid must be more trustworthy than those deduced from a pure assumption. The fact that Mr. Atcherley has merely assumed the distribution of shearing stresses along the base invalidates the results he has calculated. If his treatment be amended by the adoption of a definite method for computing such stresses it is probable that his theory may be accepted as fairly applicable to masonry dams with a flat under surface simply resting upon a horizontal foundation bed. As for dams which are firmly bedded at the base into solid rock, his theory can be of little use. The effect of fixing a dam at the base is to add very greatly to its resistance, and to modify the intensity and distribution of internal stresses to a most material extent. Moreover, the complex conditions due to the discontinuity of form at the base of a dam, as designed in practice, are such that it may well be doubted whether mathematics can be successfully applied to determine the stresses actually developed.

Even assuming the new theory to be applicable to all dams it must not be supposed that any structures built in accordance with established principles are in the least danger of failure. Mr. Atcherley merely points out a direction in which dangerous stresses may conceivably exist. In modern practice all known and unknown stresses are so deeply buried in the calculated factor of safety, and so weighted down by the uncalculated factor, represented by various unconsidered elements of strength, that none of them can struggle to the surface: The designer brings to his aid established data, some scientific knowledge, and a factor of safety, but the greatest of these is the factor of safety, which, like Charity suffereth long and will cover a multitude of sins. The general result is safe but somewhat unscientific design.

Whether the principles propounded by Mr. Atcherley are tenable or not is a question that cannot be decided in a moment. In any event, his paper may be productive of lasting good, for it has already had the useful effect of drawing much attention to the theory of masonry dams, and the upshot of the theoretical and practical investigations now being conducted by mathematicians and engineers will be a benefit to all who are interested in the design of such structures.

NOTES.

A Technical College in London.

THE Report of the Committee appointed by the Education Department to consider the question of the establishing of a technical college in London on the German model has now been made public. This is, however, too much a mere outline of a scheme to furnish matter for much discussion, for it is essentially one of detail. Everyone, we suppose, will agree that a central technical college in London worthy of the nation should be created. The idea that it should absorb existing institutions such as the Government College of Science, and other subsidised but not actually Government institutions is equally praiseworthy. It will be remembered that Messrs. Wernher, Beit, & Co. have promised a handsome donation to this object, and it will be necessary to arrange (which is purely a question of detail, but a difficult one) how to unite, in creating and carrying on such a central college, private and State munificence, and new systems and old institutions. At present we can only express a hope that some practical scheme may be formulated which will form the basis not only for public discussion but for immediate action on the part of the Government and those who are responsible for existing institutions.

Birthday Honours.

IT is satisfactory to find that art has been so far recognised in the official programme that two eminent artists, Mr. Holman Hunt and Sir L. Alma-Tadema, have been admitted to the Order of Merit. But beyond that, which is a special institution, there is no recognition of art or literature in the general list of honours. Two engineers receive knighthood, Mr. E. W. Kennedy, formerly Professor of Civil Engineering at University College, and Mr. J. Clifton Robinson, who has done a good deal towards promoting electrical tramways in London. No one will grudge these gentlemen the distinction conferred upon them; but

one may be excused for asking whether there are not architects, painters, and sculptors with equal claims.

The Marble Arch.

WE have received a pamphlet with illustrations, under the title "The Marble Arch —a Suggestion by a Citizen of London," in which Mr. F. W. Speaight, the "citizen" in question, propounds a scheme, illustrated by a plan and a perspective drawing by Mr. Raffles Davison, for giving more importance to the Marble Arch by the formation of an open semicircular *place* behind it, leaving the arch standing in the middle of a large open space. The most important point in the scheme is the suggestion for the formation of a symmetrical *place* instead of the present shapeless space formed by the meeting of the park roads. The top end of Park-lane is to be turned normal to the semicircular road, to fall into it. As far as the laying out of this road is concerned Mr. Speaight's scheme would certainly be a public improvement, though it would be much better with a stone screen than the iron railings. But if regarded in special reference to the Marble Arch it is hardly worth doing. The Marble Arch is a mere toy compared with the grand structure at Paris, with which Mr. Speaight compares it; and the Paris arch is the termination of a great vista along the principal avenue of the city, whereas the Marble Arch is and would still be out of place and with little or no meaning. If anything were done with it, it would be better to take it down once more and re-erect it in some position where it would really have a meaning. It was in its place as the entrance to the courtyard of old Buckingham Palace; it has been out of place ever since. And whether a triumphal arch ought to be left standing in the middle of an open space is another question. On this head it is worth note that the Paris authorities are at this moment engaged on a scheme for connecting up the Carrousel Arch with balustrades, instead of leaving it standing loose in the midst of an open space as at present. Mr. Speaight's semicircular *place* we should be very glad to see; but as to the arch, we would rather that the occasion were taken to remove it to a more suitable position.

Electricity on the District Railway.

THE *contretemps* which occurred in connexion with the inauguration of electric traction on the Metropolitan District Railway may well raise doubts in the public mind as to the reliability of the train services already commenced and others to be started when arrangements are complete. The line has been seriously flooded on other occasions, but as steam locomotives are unaffected by a moderate depth of water the business of the railway has never been so disorganised as it was last Saturday. If the directors had adopted a system of overhead distribution there would have been no trouble, such as may occur at any time with a live rail at track level. It must be remembered, however, that the company were practically bound to adopt the same system as that on the Metropolitan lines, and that the third rail method is one which is universally approved in this country for railway traction. Taking all things into account, it presents fewer disadvantages than any overhead system. It still remains to be explained why the County Council pumping station at Chelsea failed to clear the drainage conduits so as to avert the unfortunate flood of last week. When this station was built we were assured that the pumps were of sufficient capacity to deal with flood waters in a satisfactory manner even with the Thames at such a level that discharge by gravitation would be impossible. We are glad to find that the electrical service is now re-established between Ealing and Whitechapel.

The Lighting of Railway Platforms.

IT is satisfactory to find that railway companies have had a useful reminder of their duty in regard to the lighting of railway platforms in a case tried last week in the City of London Court in which the North London Railway Company were defendants. In this case damages were awarded to a person who was injured in consequence of the station being improperly lighted. It is a constant cause of complaint that so many railway stations are inadequately lighted, and the surprising thing is that more accidents do not happen. It is the duty of a railway company to have a good light on all its premises, and it is clear that if it does not it is liable for any harm which may be done in consequence. The inefficient lighting on the staircases and many parts of the underground stations in London is scandalous. We hope that this recent case will show the companies that this kind of parsimony does not pay.

Coating Iron or Steel with Zinc.

UPON the invitation of Mr. Sherard Cowper-Coles, we inspected last week a number of articles which had been coated with zinc by a process which has recently been introduced by him, and to which he has applied the name "Sherardising." The process consists in embedding the article to be coated in zinc dust heated to 500-600° F. This temperature is fully 200° F. below the melting point of zinc, and the process differs materially, therefore, from galvanising by immersion of the article in molten zinc. It is not only iron and steel that can be thus coated with zinc; for copper, brass, and a number of other metals and alloys can be equally well treated. A plant has been erected near London comprising four furnaces, capable of taking drums 8 ft. by 2 ft. The furnaces are heated by Dowson producer gas. The drum is charged with zinc dust, and the article to be "Sherardised" is embedded in the dust. To prevent oxidation of the zinc, the drum is then closed and the air is exhausted from the drum. The drum with its carriage is then pushed into the furnace and heated to the desired temperature. The longer the period of heating, the greater is the depth to which the zinc penetrates into the solid metal body embedded in it. The principal advantages claimed for the process are:—(1) the tensile strength of the iron or steel treated is not reduced as in ordinary hot galvanising, (2) low fuel expenditure, (3) the zinc may be made to penetrate to any desired depth, and (4) it is not necessary to remove grease from the articles to be treated.

The Testing of Cast-Iron.

IN a paper read before the Franklin Institute Dr. R. Moldenke points out that if test bars of cast-iron were made round instead of square it would be very much better. The chilling of the edges by rapid cooling always produces more combined carbon than would be the case in a circular section. Hence the chilled edges of a square bar do not represent the true character of the metal which it is desired shall be tested. In some specifications the stipulation is made that a broken square bar shall be turned down to cylindrical form for subsequent tests. Treatment in this way naturally leaves the resulting round bar with four hard and four soft places in its surface, and a bar of the kind cannot correctly indicate the properties of the iron in the castings which it is supposed to represent. The author is quite justified in saying that the general trustworthiness of a round test bar of ample diameter would be much greater than that of a small square bar which by suitable manipulation may be made to show almost any results required.

The Electric Power Bills.

THE supporters and the opponents of the electric power Bills now before Parliament have been very active during the last week. Many support the Bills because they believe that the cheapening of the supply of electric power in London will be a very great boon to the whole community. On the other hand, the opponents of the Bills point out that grave injustice will be done to many supply companies and local authorities if they become law. It will be remembered that the House of Lords Committee stated "that the introduction of a new power company not subject to statutory purchase, into areas already occupied by electric companies which are subject to statutory purchase, must necessarily inflict hardship on the latter." The present companies are compelled to supply everyone, and they are prevented from combining for the purpose of mutual assistance and economy of production. They have good reason to fear that the power companies would take away their most profitable consumers. One possible effect of this would be the raising of the price of electric supply to the ordinary ratepayer. It seems to us that private companies and local authorities have a right to demand a relaxation of the statutory restrictions imposed on them by the Act of 1888. The great power station near Newcastle which supplies electricity "in bulk" to the North-Eastern Railway Co., Armstrong & Whitworth, etc., is a practical proof of the commercial feasibility of these power schemes. It is, however, only an application on a large scale of old methods, and we are not convinced that the present companies could not supply power as cheaply as these companies could, provided that the necessary demand for constant large supplies arose. If the Bills pass in their present form we are afraid that it will lead to a monopoly and that the bulk of the ratepayers will ultimately lose over the transaction.

School of Wood-Carving.

AT the School of Wood-Carving, Exhibition-road, South Kensington, there are now on exhibition till July 15 a number of works done by the students of the school, chiefly for the Art Master's Certificate. As might be expected, these vary a good deal in merit, and include some finely-executed carving by the more advanced students, as well as elementary work. Several of the exhibits took prizes at the Carpenters' Hall Exhibition of Works in Wood and Wood-carving. A well-executed Renaissance frieze—the subject selected by the Carpenters' Company—by Mr. Albert E. Smith, gained the first prize (5*l.* and silver medal). It is evident that this student has well studied the fine examples to be found in many of our city churches. The frieze immediately below this, by Mr. Harry Rogers, is scarcely inferior, and shows much delicate work. The design of these as well as the execution is original. A carved truss for a chimney-piece is also interesting, and gained a special prize at the Carpenters' Hall. The majority of the subjects being students' work, are executed in pine and white woods, but a number of panels for the master's certificate are in walnut. The best of these, notably that by Mr. F. Fisher, show considerable skill. Other exhibits include carved door panels, mirror and picture frames, and a series of work done during the session by the students of the school. The majority of these appear very promising, and the school is doing excellent service in training and turning out skilled craftsmen able to execute good work.

Dudley Gallery Art Society.

THE Society still keeps the name derived from its old home, but the "Dudley Gallery" is no more, and the Society's water-colours are to be seen in the large room at the Alpine Club—good enough in point of light, if it only had a better external approach. Special effort, we understand, has been made to render the first exhibition in the new quarters a good one, and not without success. The Dudley Gallery water-colour exhibition has usually represented rather too much what may be called respectable attainment in the art, rather than originality; but this year there is a larger proportion than usual of works that are above the average. The principal contribution by the Society's new President, Mr. Burleigh Bruhl, "On Oulton Broad" (100), is a really fine work, perhaps not free from "manner" (in the treatment of the water), but admirable both in composition and colour. Mr. Newton Benett sends two of his best works, "Corfe Castle" (3) and "Castle Bridge and Village, Corfe" (268), the latter an architectural subject, very well treated. Mr. Aldridge's "Littlehampton" (72), a highly finished large drawing, has a little too much of that look of prettiness which is too prominent in many of the exhibits, those of Mr. Sylvester Stannard for instance; clever work, but with a suggestion of picture-making about it. But we are not without works in a broader and more vigorous style; those of Miss Margaret Bernard, for instance, and Mr. Waller Stacey's "Late Summer-Time" (192), a truly fine and artistic landscape. Mr. Duassut's small works, sometimes a little overfinished, are all good; one of them—"On the Common, Danbury" (195)—specially so. Among works of the higher class are also Mr. Wynne's "In the Chulhins, Skye" (37); Mr. Stacey's "The Old Gravel Pit" (43), noticeable, like his other work, for its individuality of colour scheme; Mr. G. Marks's "On Shere Heath" (54); Mr. G. F. Lamb's "A Surrey Common" (76), with a beautifully treated sky; Mr. R. A. K. Marshall's "Willowpark and the Sisters Rocks, Tintagel" (93); Mr. Twigg's "Heather on the Beach, Studland" (94); Mr. F. Dixey's "Burnmouth, Berwickshire" (145); Mr. H. Stannard's "Stormy Weather" (98), a threatening sky above an expanse of ploughed field; and Mr. Stormont's exceedingly fine snow landscape, "The Jaws of Borrowdale, Winter" (67), one of the most important works in the collection. In some drawings which are excellent in their school we are reminded (not unpleasantly) of an earlier epoch of water-colour art, as in Mr. Hereford's "Ben Lawers" (11), highly finished work of a somewhat too Academical order, but not without its interest. Miss Warren exhibits an architectural interior, "The Central Hall, National Gallery" (108), which, though rather hard in effect, has the merit (important in an architectural subject) of excellent perspective drawing.

Soirée of the Society of Arts.

THE annual soirée of the Society of Arts was again held, as on one or two previous years, in the garden of the Botanic Society, on Tuesday evening last. The weather was perfect, and the effect of the myriad lights among the masses of trees most beautiful. Very charming also was the effect of some scenes from the fairy portion of the "Midsummer Night's Dream" in a glade surrounded by trees, with a rising bank of grass for the stage; a part of the play which seems just meant for open-air acting by night. The Royal Artillery band played in the conservatory and the Grenadier Guards' band in the middle of the garden. There were other attractions, and a very large attendance of people, who must have spent a very enjoyable evening.

EXHIBITIONS OF THE EGYPT EXPLORATION FUND.

THE exhibition of objects now displayed in the Library of the Society of Biblical Archæology, at 37, Great Russell-street, W.C., is the result of the excavations conducted last winter by Dr. Naville and Mr. H. R. Hall, and, although perhaps not so rich in the small antiquities which the season of 1903-04 provided from the same site, it will be found to contain results of considerably greater interest to the architect and archæologist. The temple from which the objects come was discovered by Dr. Naville and Mr. Hall in November, 1903, and is the mortuary chapel of King Neb-hapet-ra, Mentuhotep, of the XIth dynasty, who held sway over Egypt in the XXVIth century B.C. It is situated at the foot of the frowning circus of cliffs which rise precipitously behind Dêr el-Bahari, and immediately to the south of the great XVIIIth dynasty temple of Hatshepsut, which is so well known to all who have visited Thebes. The architectural features of the building present many important and interesting data as to temple construction prior to the XVIIIth dynasty, especially as the excavations have revealed the remains to be in a remarkably well-preserved condition, and the visitor, by observing the many fragments displayed at the exhibition, aided by the excellent photographs and the plan, will be able to reconstruct in his mind the magnificent building as it stood nearly 4,700 years ago.

The temple itself was in the form of a pyramid on a square base, about 15 ft. high, surrounded by a triple colonnade of octagonal columns. All this was situated on an artificially-squared rock platform, faced with fine masonry, and approached from below by an inclined plane or ramp. Below the rock platform on the side of the ramp was another colonnade, the roof of which was an extension of the flooring of the rock platform. The pillars of this lower colonnade were square, and on the wall behind, formed by the masonry facing of the rock platform, was a series of reliefs, beautifully coloured, representing processions of officials and incidents in the daily life of the court. The very many fragments on view at the exhibition show a beautiful and delicate school of art to have existed during the period in question, quite unlike the usual rough work which Egyptologists have been accustomed to associate with the XIth dynasty. The columns in both the upper and lower colonnades each bear the name and titles of King Mentuhotep incised in the stone and coloured. The core of the pyramid is of rubble, faced with fine white limestone masonry, the work of the cornice of the base being particularly good, and the visitor will gather from the fragments exhibited to what a high pitch the mason's art reached during the middle empire. Built behind were a number of shrines in which were buried the king's favourites, who also filled the office of priestesses of the goddess Hathor. The stonework of these is most intricate and curious, while one at least is painted to look like wood. The mummies and sarcophagi of two of these ladies were discovered under the pavement of the colonnade, the latter being made of massive limestone slabs incised with a line of inscriptions, the hieroglyphics of which are perhaps the most beautiful of their kind known. Only photographs and drawings of these sarcophagi are to be seen at the exhibition, the originals, owing to their rarity and beauty, being claimed by the Egyptian Government for the museum at Cairo. Another feature is the three black granite statues of Usertsen III., one of the great kings of the XIIth dynasty, which were set up by him in his predecessor's temple. These statues represent the monarch at three different periods of his life—as a young man, in middle age, and in more advanced years. All, however, bear the characteristics of his dynasty, the high cheekbones, sad eyes, and the long fierce mouth with the corners drawn down. The portrait in each case is very striking.

In Ramesside times, about 1,400 years later, the temple appears to have fallen into disrepair. A fine painted portrait statue of Paser, an official of Rameses II., who superintended restorations, may be seen, while a relief showing a still later king, Siptah, worshipping Hathor, points to his also having probably conducted repairs there. After this the building seems to have fallen into complete decay until it was gradually enshrouded by the sand of the desert, where it has lain covered ever since.

Among other interesting objects to be seen at the exhibition are a very beautiful cow's head in alabaster, of the best type of XVIIIth dynasty workmanship; two wooden coffins, of the period of the XXth dynasty, with the lids carved as portraits of the deceased and painted all over with religious scenes and texts; a bust of a dancing-girl of the Ramesside period; several portrait statues of officials of various epochs; and a large number of workmen's tools, baskets, etc. It is hoped that next season the tomb of the king will be found and the small remaining portion of the temple cleared.

The Egypt Exploration Fund dispatched also, in 1904-05, an expedition to the copper and turquoise mines at Serabit el-Khadem, in the Sinaitic peninsular, which the Egyptians had worked from the earliest dynasties. Amenemhat III., of the XIIth dynasty, had built a small rock temple there dedicated to Hathor, and stretching out in front of it was a long series of chambers used by the Egyptian soldiers and miners dating from various periods down to late Ramesside

times, about B.C. 1000. These ruins were described by Lepsius as far back as 1845, and the inscriptions were copied and the temple measured up by the Ordnance Survey of Sinai in 1869. Several archæologists have since visited the spot, and, last winter, Professor Flinders Petrie was sent by the Egypt Exploration Fund to make an examination of the site. Unfortunately, as might have been expected, the yield of antiquities is poor, consisting chiefly of some broken red sandstone figures of the middle empire, a stele of Amenhotep III., of the XVIIIth dynasty, and some Ramesside figures, including the lower part of a statue of Rameses II.; in addition are a number of pots and stone tools used by the workmen. Professor Petrie has taken some photographs and prepared a model (scale 1-50) of the buildings restored to what he considers to be their original condition. Plans, elevations, and sections have also been made, and copies and photographs of the early-empire inscriptions in the Wady Maghera, which were published by Lepsius in 1847. Characteristic of the site are a number of round-topped monoliths, some inscribed in hieroglyphs with mining records, others uninscribed. These Professor Petrie considers to be Semitic "Bethels," and has put forward the theory that Serabit el-Khadem was the centre of a Semitic cult. In support of this he claims, as additional testimony, two Egyptian lustral basins found in the court of temple, photographs of which are shown at the exhibition. These he considers to have been used for the purifications so characteristic of Semitic worship. The mounds of ashes which formed the "slag" from the copper smelting he supposes to be the remains of burnt offerings made by "early Semitic pilgrims." That not all archæologists are able to agree with him is clear from an article in the current number of *Man*. Mention may also be made of a collection of XVIIIth dynasty blue faïence and steatite ware, which has, unfortunately, lost most of its colour, and a few curious Egyptian figures inscribed in an unknown script.

Dr. Grenfell's spoil consists almost entirely of antiquities of the Græco-Roman period. It includes some fine specimens of painted Roman glass and a very beautiful little head of Aphrodite. Amongst the small figures, so characteristic of the period, a bronze Ceres is remarkable for its excellent workmanship.

RESTORATION OF TOWER, CHALGRAVE CHURCH, BEDS.

CHALGRAVE CHURCH dates from the XIIth century. About fourteen years ago the upper portion of the tower fell, and since then it has been partly pulled down and covered with a corrugated iron roof. The part above the apex of the nave roof has been re-built recently, but it was not considered advisable to restore it to its original height, owing to the condition of the walls. The old peal of bells has been re-hung. The addition has been built almost entirely of the old stone that at one time formed the upper walls. The work has been carried out by Mr. J. Cassé, of Hampton Wick.

JOHN P. SEDDON.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

A SPECIAL general meeting of this Institute was held, on Monday, at No. 9, Conduit-street, Regent-street, the President, Mr. John Belcher, A.R.A., in the chair.

The meeting was summoned in accordance with by-law 60, on the requisition of Messrs. S. B. Russell, Alfred H. Hart, T. Edwin Cooper, Herbert Wigglesworth, Alfred W. S. Cross, Wm. Flockhart, C. E. Mallows, R. Stephen Ayling, *Fellows*; Thomas A. Pole, H. V. Lanchester, J. E. Newberry, Herbert W. Wills, John Anderson, *Associates*, in order to discuss the following amendments, proposed by the requisitionists, to the regulations for architectural competitions passed at the meeting of June 5, viz. :—

Clause 14 to read as follows :—

"In all works costing an estimated sum of 25,000*l*. and upwards, three assessors to be appointed unless there are insurmountable objections. As stated above, the President of the Royal Institute of British Architects is always ready to advise on this or other points."

The amendment was negatived after discussion.

[The clause stands as follows :—"In the case of works of considerable magnitude it is desirable that three assessors should be appointed. As stated above, the President of the Institute is always ready to advise on this or other points."]

It was also proposed that the clause as to scale of charges in the original draft should be reinstated in the following form :—

"The usual R.I.B.A. scale of charges for assessing competitions is the sum of 30 guineas plus 1-5th per cent. upon the estimated cost of the proposed building."

This was adopted. A proposal met with the approbation of the meeting that it should be an instruction to assessors that their award should be given strictly on the conditions on which the competition was invited.

THE CASE OF GIBBON *v.* PEASE.

IT will be remembered that in connexion with this case, which excited so much interest in the profession a little while since, the Editor of this Journal undertook to take charge of subscriptions for assisting Mr. Pease in the cost of contesting a case which involved a principle of so much consequence to architects in general.

The following letter from Mr. Pease's

CHALGRAVE. CHURCH BEDFORDSHIRE. S.W. VIEW.

solicitors explains the financial state of the position at present:—

"SIR,—We are now enabled to give you a balance-sheet in this matter, that you may see exactly how Mr. Pease is situated, apart from the defence fund which you opened in your paper. The costs of the plaintiff's action have been taxed at 115*l.* 14s.; the costs of the plaintiff's appeal have been taxed at 56*l.* 0s. 11d., including the carrying of objections to the original taxation as far as the judge in chambers.

Our own bill against Mr. Pease for the costs of the action and of the appeal amounts to 260*l.*, this making a total of 431*l.* 14s. 11d. To set against this we have received the following subscriptions:—From the Surveyors' Institution, 100*l.*; from the Royal Institute of British Architects, 105*l.*; from the Society of Architects, 50*l.*; from Messrs. James & Morgan (private subscription), 5*l.* 5s., this making a total of 260*l.* 5s. You will see, therefore, that this leaves Mr. Pease to pay the difference between these two sums, viz., 171*l.* 9s. 11d.

We know that you very kindly opened a fund to assist Mr. Pease some months ago, but we do not know how much it amounts to; but we must say we feel that it is only right to our client that we should appeal to you, as the official organ of architects in general, to give Mr. Pease's fellow practitioners an opportunity of seeing that a young and by no means wealthy practitioner should not be a loser by this substantial sum because he has endeavoured, instead of propitiating a wealthy client at the expense of professional etiquette, to assert a point of practice of the greatest importance to the architectural profession at large.

CHARLES ROBINSON & Co.,
Solicitors for the Defendant.
10, Norfolk-street, Strand.
June 23, 1905."

It will be seen that in spite of the assistance from various quarters named in Messrs. Robinson & Co.'s letter, Mr. Pease is still a loser to the extent of more than 170*l.* The subscriptions we have received towards the case have been much fewer in number than we should have expected, considering the great importance of the decision to architects; the following is an alphabetical list of subscribers with the amounts (those not otherwise described are of London):—

	£	s.	d.
Bristol Architectural Society	5	5	0
Cardiff Architectural Society	3	3	0
A. W. S. Cross	10	10	0
W. J. Hale (Sheffield)	2	2	0
G. Hubbard	10	10	0
A. Humphreys (Llandudno)	1	1	0
Institute of Architects of Ireland ..	5	5	0
S. Inskip Ladds (Huntingdon)	0	10	6
Charles Lucas (Paris)	1	0	0
J. H. Martindale (Carlisle)	1	1	0
A. E. Powles (Northwich)	2	2	0
Myddelton Shallcross (Liverpool) ..	5	5	0
H. H. Statham	1	1	0
Philip Sturdy (Bournemouth)	2	2	0
J. R. Wigfull (Sheffield)	2	2	0
Wolverhampton Architectural Association	2	2	0
	55	1	6

There was also a promise of 5 guineas from a well-known London architect, who I regret to find is too seriously ill at present to attend to any business, though it is understood that the subscription may be counted on.

It is not a very large sum for the profession to have subscribed towards assisting a young architect who was contesting a case of such importance to architects in general. Under the circumstances, I may say that the subscription list may be considered to be kept open till July 31, on which date I shall hand to Mr. Pease's solicitors a cheque for whatever the fund may then amount to, in the hope that some substantial addition may be made to it before that date.

H. H. STATHAM.

A BUILDING SITE IN LOMBARD-STREET.—The banking-house, Nos. 75-76, on the north side of Lombard-street, has been lately vacated by Messrs. Melville, Fickus, & Co. On June 28, at the Mart, a building lease of the property, for a term of eighty years, was let at 3,000*l.* per annum. The site, which is close to Pope's Head-alley and opposite St. Mary Woolnoth Church, has a frontage of 35 ft., and covers an area of about 1,600 ft. superficial. The lessee has the option of exercising the right of pre-emption within a certain fixed period. The house was formerly occupied by Messrs. Willis, Percival, & Co., bankers and the Society for the Relief of Poor Clergy.

THE INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.*

IN the discussion on Mr. Greatorex's paper Mr. J. Lemon (Southampton) said he was of opinion that the sooner by-laws were done away with the better. They wanted to be placed in the same position as the City of London, and have a Building Act. They all knew that some of the model by-laws, if adopted, were quite unworkable. He did not hesitate to say that legislation of a most drastic character was required. If they had an expert Committee of representatives of the Institute of British Architects, the Surveyors' Institution, and that Association, they might arrive at some solution of this difficult problem. He proposed a vote of thanks to the author of the paper.

Mr. G. W. Lacey (Oswestry) seconded the vote of thanks, and hoped the full report of the Sub-Committee might soon be available for the use of members of the Association.

Mr. James (Grays) protested against the suggested reduction of the size of windows from one-tenth to one-twelfth of the size of the room. Seeing how potent sunlight and fresh air were against disease they ought not to reduce the amount of light.

Mr. Elford (Southend) said with regard to the suggestion that buildings might be allowed to be constructed in wood and other materials, so as to cheapen the cost of construction, the greatest difficulty was likely to arise in the future on the maintenance of such structures.

Mr. MacBrair (Lincoln) contended that legislation that went beyond public opinion was not carried out, and that was why at the present time they wanted some reasonable by-laws. Local Authorities ought to have the power to modify by-laws.

Mr. Simonds (New Maldon) considered that rural and urban by-laws should be kept distinct. It was not possible to reduce the cost of building much in urban districts, but it was possible to reduce it very materially in rural districts.

Mr. Smillie (Tynemouth) said he suspected that the representations which had been made would not have much effect with the Local Government Board. Instead of seeking to improve the building by-laws, an effort should have been made in the direction of reducing them to an absolute minimum.

Mr. Chambers Smith (Sutton) deprecated public officials speaking harshly of the Local Government Board, and said he had recently received much assistance from the officials in getting through a new series of by-laws for his district.

The President (Mr. Collins, Norwich) said he was strongly in favour of a general Building Act for the whole of the country, with each district having its own local by-laws to meet local circumstances.

Municipal Administration.

Mr. E. J. Elford, M.Inst.C.E. (Southend), read a paper on "Administration by Municipal Engineers." He said one of the prime essentials to the efficient administration of a municipal engineer's department was a sufficient and qualified staff. Unfortunately, some local authorities did not appreciate the importance of the former, but the author was fortunate in serving a corporation who, demanding a high standard of efficiency, recognised that the expenditure required to provide a sufficient staff was money well spent, and was necessary if the work was to be carried out with the greatest economy. The author should not forget to refer to one factor, which had an important bearing upon the quality of service likely to be secured, viz., the question of salary or wages.

It was unreasonable to expect the best results from badly paid employés of any grade, and the author had found by experience that it was the highest economy to pay even more than other people, and so get the pick of the men, than to pay less and have to take what others leave.

In the author's borough the drains of every new house were twice tested, first by water before they were covered in, and again, on the completion of the building, by smoke. The building inspectors were required to enter regularly in a book provided for the purpose a complete record of all visits paid to new buildings, with particulars of the size and inclination of drains, nature of foundation, size of timbers, and other details of importance.

The President said no words were needed to emphasise the necessity of having a proper system of carrying out the administration and work of a municipal office.

Mr. Bush (Sudbury) proposed a vote of thanks to Mr. Elford for his paper. He believed any gentleman who followed Mr. Elford at Southend would find his work very much easier, because of the excellent system of administration which he had introduced into the office there. He believed the only way in which they could find out whether they were working their department in the best possible manner was by adopting some system of record books, so that they could see week by week and month by month what was going out in expenditure.

Mr. Cooper (Wimbledon) said the application of the matter was a subject to which too much pains could not be given, and with his own staff there was practically a competitive examination for every position.

Mr. MacBrair (Lincoln) did not think it was possible to have a fair monthly average of municipal expenditure.

Mr. Bamber (London) referred to the desirability of the Association having some more ready and economical means of making tests of stores. They ought to inaugurate a central laboratory with a chemist of their own to which samples of stores could be forwarded for testing. That could be done more economically than by referring these matters to experts. As a member of the Standardisation Committee on Cement he realised the importance of greater uniformity in the methods of testing.

The President said he had kept a check of expenditure by means of diagrams for years past, and considered the system well worth the time it occupied.

Mr. Elford, in replying, expressed himself as in agreement with Mr. Bamber as to the testing of cement.

Tramway Materials and Construction.

Mr. J. Owen (Colchester) read a paper on "Tramway Permanent Way Materials and Construction." He said the standard specification and section of tramway rails and fish-plates issued by the Engineering Standards Committee were admirably suited to meet the varying conditions of traffic in this country, and their adoption enabled the manufacturer to keep in stock a quantity of each kind of rail, while saving the cost of providing a new set of rails for each individual order.

Rails 60 ft. in length were now nearly universally used, as it had been found that they were but little more awkward to handle than those of 45 ft.

The fewer number of joints more than compensated for any small increased difficulty in handling.

In the earlier days of electric traction the carbon specified in many cases was as low as 0·35 per cent., but with heavy traffic and steep gradients this soon proved much too low. An average of 0·50 per cent. had been proved a happy medium, being sufficiently low to avoid signs of fracture, even when crowed to a curve of 30 ft. radius, and sufficiently high to obtain a chemical composition producing a tough, durable rail.

For the British Standard Section No. 2 the weight of fish-plates was given as 49½ lb. per pair, but this, being weight before the holes were cut, was somewhat misleading. The actual weight as supplied was 46¾ lb. per pair—a difference of about 6 per cent., sufficient to make a large error where an extensive contract was involved.

Perhaps in no other department of tramway construction had the British manufacturers made such improvements as in the case of points, crossings, etc. A comparison of the old short cast steel point with the 13 ft. 6 in. point now used would best demonstrate this.

Iron-bound crossings were constructed in a similar manner to the above. Automatic and movable points were also fitted with tongues of manganese steel.

The great advantage of using iron-bound points and crossings was that uneven wear at the joint, due to difference in material, was greatly reduced, as the insert plate was splayed back and tightly fitted.

The life of the rail was only that of the

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* Continued from last week.

joint. To provide support various methods had been adopted.

The joint plate had been used in various places with unvarying success, and was a proved cure for "knocking" joints in an old track. Its principle was that of the parallel plates in a level. It consisted of a metal bed-plate resting on the concrete, a steel "supporting" plate in which two holes were screwed, and of two hardened steel bolts, which, on being screwed home through the holes provided in the supporting-plate, engaged with the bed-plate, and thereby lifted and supported the joint to any required position. Any subsequent depression, due to the rolling load or any other cause, could be readily adjusted by the use of a box spanner without any disturbance of the paving. In new track work it was claimed by the inventor to entirely obviate the necessity of expensive steel fish-plates, their primary function, that of support, having entirely ceased. In place of fish-plates, what were really two large cast-iron washers were substituted, being held from lateral movement by two ordinary tie-bars. In Manchester, where the joint support was first tested, several "knocking" joints were remedied, and were now in a perfect condition after twelve months' test with a one-minute service, which was equal to a five-years' test with a five-minutes' service.

But little saving was effected by using tie-bars notched at one end and screwed at each end. When finally easing the track in line with bars, the notched ends slip, thus altering the gauge. It should be insisted that all tie-bars comply with a certain standard; those supplied by a certain maker were so weak that during the night, owing to contraction of the rails at a curve, the tie-bars buckled, altering the gauge as much as 10 in.

In choosing the type of bond, preference should be given to one which could be re-used in case of repairs, etc.

For a 40-ft. curve, with a car 6 ft. 7 in. in width and 4 ft. 8½ in. gauge, the minimum distance between centres of tracks would be: Overhang of car on straight track, 1 ft. 10½ in.; extra overhang on curve, 1 ft. 7⅞ in.; minimum clearance allowed, 1 ft. 3 in.; gauge, 4 ft. 8½ in.; centres, 9 ft. 5⅞ in.

With 4 ft. 8½ in. gauge and a curve of 50 ft. radius the cant necessary for a speed of six miles per hour worked out at 208 ft., or 2½ in., thus emphasising the need for cautious driving round curves where the necessary cant might not be obtained, owing to reverse cross-fall of street, etc.

Mr. A. D. Greatorex (West Bromwich) asked for some information as to how long the special joint had been in operation and the towns which had tried it. It appeared to him that the whole weight of the cars went on to the screws. If they had cars such as were in use in the Black Country, of ten tons in weight, carrying seventy passengers, it was a very heavy weight on the screws.

Mr. Elford (Southend-on-Sea) said he had seen a whole piece of track moved over bodily a distance of 18 in. in one night.

The President said the Norwich tramway was laid with the lightest section of rail allowed by the Board of Trade for any electric tramway in England. The rails were something like 54 lb. to 64 lb. to the yard. The track had been working for about five years, and they had the greatest difficulty in finding the joints. They were all laid on the cast-weld system, and he did not know that they had a defective joint in the seventeen or eighteen miles of track. He attributed the good result to the joints, together with a reasonable amount of anchoring.

Mr. Owen, in replying, referred to the alteration of the gauge. At night he left it all right, and passed it for concreting, but next morning he thought a traction engine had been over it, for every tie-bar was buckled. He put it down to the concentration of weight at the curve.

Highways and Modern Traffic.

Mr. C. H. Cooper (Wimbledon) read a paper on the adaptation of highways for modern traffic. He said it must be apparent to the most casual observer that many of the existing highways of this country were sadly in need of improvement in order to adapt them for rapid traffic, such as had been introduced with self-propelled vehicles. The fact that some of the existing carriageways had remained in their present condition as a menace to life and limb for so many years reflected great discredit on highway authorities.

Many authorities allowed buildings to be brought forward in such a manner that ultimately large sums of money had to be expended in order to widen highways which must eventually form arterial thoroughfares.

The author had been much struck with the great difficulty experienced in getting local authorities to appreciate the necessity of wide highways and the rounding off of corners, and he had been met with such arguments as that Ratcliff Highway, which was only 30 ft. wide, carried more traffic than any road in his district, and why, therefore, should he insist on a wider road—and this, not from an ordinary member of a council, but from an eminent member of the engineering profession.

It would be well if some provision were in force to compel highway authorities to have all new streets so laid out that every portion of the carriageway was visible from every other part of such carriageway which was within a distance of at least 100 ft., and that at the junction of any two carriageways the same rule was observed as if they formed the same street. The reason of this provision was that vehicles approaching should see each other at as early a period as possible so as to give every opportunity of avoiding collision. The surface of carriageways was a matter which required considerable attention, not only to carry horse traffic in comfort, but more especially to ensure safety and comfort to cyclists and motorists. The surface should therefore be as even as possible, and although all carriageways should be properly arched there should be no excessive arching such as would lead to the centre of gravity of vehicles being placed dangerously near the outer wheel. No gully grating should be allowed in the carriageways, but gullies should be placed beneath the paths, with a proper weir formed in the kerb to take the water on such grating.

Many persons looked on motors with pneumatic tyres as causing considerable damage to highways. This was no doubt the case where carriageways were badly constructed in the first instance, or were badly maintained; but the author knew of no form of traffic which caused less damage to carriageways, provided the surface was properly laid and a proper state of moisture maintained.

There was no doubt that, when railways became the great carriers of the country, the question of our highways became a matter of secondary consideration; in fact, in too many cases, they were neglected to an extent that must have damaged many interests. This state of affairs was rapidly changing, as our carriageways had, with the introduction of self-propelled vehicles, become a great means of conveying the wealthier portion of the pleasure seekers. At the same time the introduction of heavy motor traffic was being instituted for the carrying of goods, a class of traffic which must of necessity increase enormously. Local authorities, if they wished to remain highway authorities, must therefore make up their minds that the ordinary country road, which, in years gone by, was never subjected to a load exceeding 2½ to 3 tons, would in the near future be subjected to loads of at least ten times that amount, and that any attempt to prevent these loads traversing their roads at seasons when injury was likely to be caused could not be maintained. The only step for authorities to take was to form their highways in such a manner as that at all seasons they would be capable of bearing heavy traffic, and, above all, to see that all new streets and roads were so laid out that they would carry heavy traffic at all seasons.

Mr. A. T. Davis (County Surveyor of Shropshire) proposed a vote of thanks to Mr. Cooper for his paper. He agreed with Mr. Cooper as to the rounding off of corners, but considered it better to round off the building line than the footpath line. When driving through the new Aldwych with a gentleman who was in business, he said the new thoroughfare was too wide for shops, as it was so much trouble to cross from one side to the other, and tradesmen did not want their possible customers to be forced to walk on one side of the road.

Mr. Wakelam (County Surveyor of Middlesex) said he had prepared a scheme for widening the trunk roads of Middlesex from 80 ft. to 100 ft. The estimated cost of widening the Brentford road was 475,000*l*. If the trunk roads were to be widened, it meant an Exchequer grant, because the County of Middlesex could not bear the whole cost. In Middlesex they were erecting about 1,000 notice-boards for dangerous places, which showed the necessity of improving the roads and curves in Middlesex.

Mr. Cooper, in reply, said he had no fear of their having too many wide roads. At Brentford, vehicles had to be pulled up on the footpath to allow them to unload.

Cromer Waterworks.

Mr. T. Pritchard, M.Inst.C.E., read a paper on the water supply of Cromer. He said the works were originally designed and carried out in the year 1877, and intended to meet the then requirements of Cromer—at that time only a small seaside village, ten miles from a railway station, with but few summer visitors.

With the advent of, first, the Great Eastern, and afterwards the Great Northern and Midland Railways, the village grew into a considerable seaside resort, and the waterworks had from time to time been enlarged to meet the growing requirements of the district

The works were originally carried out by a water company, which, with varying fortunes, conducted the business until the year 1902, when it was acquired by the Urban District Council.

The original works carried out by the company, of which Mr. Hodgson Jones, M.Inst.C.E., was the engineer, comprised a pumping-station, situate on the west side of the Roughton-road, having a well (No. 1), 6 ft. in diameter, sunk 83 ft., with a bore-hole varying from 12 in. to 9 in. in diameter, sunk to a depth of 400 ft. into the chalk.

The bore-pipe was taken 10 ft. into the chalk, but, after the pumps were fixed, this was found to be in the water at times; other means had to be found to exclude the sand. A clay-and-cement joint was put lower into the chalk, and a guide-pipe pressed into same and brought up in the bore-pipe, with the space filled with cement. This had the desired effect, and sand was permanently stopped out.

The pumping plant consisted of a 10-horse-power horizontal engine, by Hanna Donald Wilson, driving a bore-hole pump.

A covered service reservoir, holding 120,000 gals., was constructed on the high land above the town.

In 1887, it was necessary to obtain an additional supply when a second well and bore-hole were sunk 30 ft. to the northward of No. 1 well, the well being brick, lined for a depth of 12 ft., and a 12-in. boring carried down 242 ft. into the chalk, being lined with steel bore-hole pipes for a depth of 172 ft. 9 in.; the remainder being in the chalk was unlined. A 9-in. bore-hole pump, capable of lifting 6,000 to 7,000 gals. per hour, was fixed in this well.

In the year 1888, Mr. J. C. Melliss, M.Inst.C.E., was consulted on the question, and since that time had acted as engineer for the company and the council since the transfer of the works, the author having been associated with him since 1891.

Well No. 3 was sunk to a depth of 183 ft., lined with brickwork to a depth of 50 ft., continued with cast-iron cylinders, varying from 8 ft. to 5 ft. in diameter, into the chalk; a 12-in. bore-hole was carried 40 ft. down from the bottom of this well.

This well was connected with No. 2 well by an adit, curved round so as to miss No. 1 well, so that the water obtained in both No. 2 and No. 3 would be available at either well. As a fissure was visible on the north face of the well, an adit was cut to follow it for a distance of about 50 ft.

The rest-water line was 111 ft. below the surface, and the yield from the wells and adits at this time amounted to 200,000 gals. per day.

Professor Frankland stated in his report:—"The water is of most excellent quality for dietetic purposes, absolutely free from all evidence of previous sewage or animal contaminations, and of every moderate hardness for chalk water, and Cromer may be

congratulated on being supplied with one of the best waters in Great Britain."

Towards the end of 1895, owing apparently to dry seasons, the yield of the wells had fallen to 63,000 gals. per day, with a water-level about 50 ft. below sea-level. It became necessary to obtain an additional supply; rights were obtained from the owner to drive adits in the chalk under 13 acres of land to the south of the pumping station, and by May, 1896, 400 ft. of adits, 4 ft. 6 in. wide and 6 ft. high, were driven east and west of original heading, which, after continuous pumping during their construction, brought up the yield to 190,000 gals. per day. This was sufficient to last for another two years, when it was decided to further increase the length of adits by 300 ft., which brought the yield up to 254,640 gals. per day.

By September, 1902, when the test pumping for arbitration purposes was made, it was found that the yield from the works had again fallen to 160,000 gals. per day, and, as it would be some time before the auxiliary works would be available, it was decided to further extend the adits, when, by driving a further length of 265 ft., the average quantity shown by a five-days' test amounted to 296,000 gals. per day. Since this time there had been no test of the quantity available, so one could not say what it was, but during last summer the yield did not appear to have seriously fallen off.

In the year 1900 it was considered advisable, not on account of any failure in the existing works, but in consequence of the growth of population in many of the surrounding places, to go further afield to secure a larger supply of water. For this purpose it was decided that auxiliary works would be advantageous on account of the increased quantity of water that would be available as well as on account of the benefit that would arise by having a service reservoir placed on the highest ground in the neighbourhood, which would give sufficient pressure to supply the whole of the company's district and allow that district to be considerably extended.

Before deciding upon the site for such auxiliary works, Mr. Clement Reid and Mr. William Whitaker were consulted on the geological aspect of the question.

A site was decided upon in the valley at Melton, about four miles to the south of Cromer and the same distance from the sea, where it was considered the chalk would be met with about 10 ft. above Ordnance Datum (as a matter of fact, the chalk was touched at 12 ft. above Ordnance Datum). A site, having an area of one acre, was acquired for the well and pumping station, together with the right of driving adits in the chalk under the surrounding lands.

A test bore-hole was sunk on the site at Melton in 1901, 8 in. in diameter and 203 ft. deep, lined so as to exclude all water lying above the chalk, when the water flowed over the surface, and had been overflowing ever since.

The permanent well had recently been completed; it was 160 ft. deep, lined from the surface to 125 ft. with cast-iron cylinders 1¼-in. thick, built up in seven segments to each ring. From the bottom of this well a 12-in. diameter bore-hole had been sunk 100 ft.

Adits had been driven from this well to connect with the test bore-hole, and in following fissures which appeared, the total distance driven being 417 ft.

It had been hoped to have obtained a supply of 1,000,000 gals. a day at the new works so as to ensure an abundant supply for many years to come, but this quantity was not reached (although there was no doubt that by extending the adits it would have been), and, as the council considered they had expended as much as they were justified in doing, the work was stopped and the yield was proved on testing to amount to 730,000 gals. per day.

This amount equalled about 2½ times the water supply of Cromer, the maximum day's demand, which, at the height of the last season, amounted to just over 300,000 gals.

In the discussion which followed,

The President asked whether the water-level was ever lowered below the mean sea-level, and, if so, were there any signs of the infiltration of sea-water?

Mr. A. D. Greatorex, who moved a vote of thanks, remarked that it was gratifying to know that Cromer had a good supply of pure water.

Mr. W. Nisbet Blair (St. Pancras), who seconded, remarked that with two wells he had recently sunk in St. Pancras they lifted the water by the air-lift system. That unquestionably proved more economical than the deep-well pump, and they were abler to get a higher delivery from the fixed-size bore-hole than they could from the pump fixed in the bore-hole. Had Mr. Pritchard considered the method of lifting water by an air-lift? as any difficulty in getting the quantity by a deep-well pump would be overcome by an air-lift.

Mr. Schlund (Woolwich) said it had occurred to him that the caulking of the joints with oakum to stop the leaking of water from the reservoir was not a sanitary thing to do—that the oakum would form a breeding-ground for bacteria.

Mr. James (Grays) mentioned that in his district they had a pumping station for practically the whole of South-east Essex, situate half a mile from the Thames. A complaint was made that the water was dirty, and, on a sample being sent to Dr. Thresh for analysis, he found that it contained 17 grains of chlorine per gallon and that about 6½ per cent. of Thames water was going in, making the supply dangerous to drink.

Mr. Pritchard, in reply, said there had been no infiltration of sea-water. Practically the whole of the water came from the land side. For several years they had felt they might have the sea in at any time, and that was one of the reasons why they decided to go inland for their new works. With reference to the caulking of the faulty joints of the reservoir with oakum, he explained that the joints were cut down the full depth of the brickwork, and there were 2 in. of cement covering the oakum. He asked the chemist before putting it in if there was any risk, and he said there could not be as the water never touched the oakum.

Mr. P. H. Palmer (Hastings) contributed a paper on "Armoured or Reinforced Concrete," and Mr. A. R. Galbraith a paper on "Reinforced Piling."

Reinforced Concrete.

Mr. Philip H. Palmer, M.Inst.C.E., in his paper on "Armoured or Reinforced Concrete," said that armoured concrete had been defined as a heterogeneous material consisting of a matrix of concrete in which was embedded a skeleton framework of iron or steel. Its use in various forms of construction had been known for many years, but it was only within the last few years that the varied problems involved in its use had been thoroughly studied and understood. On the Continent and in the United States the progress had been rapid, but in this country engineers had not, until a comparatively recent date, given that attention to this work and its enormous possibilities that it should have received. The author was of opinion that, before many years, the principles of armouring concrete would have been fully appreciated, and this method of construction almost universally used in concrete structures for engineering purposes.

The laws governing the combination of concrete and steel, although not absolutely determined, were known with sufficient exactness to permit the design of nearly all classes of structures with the assurance—employing good material and first-class superintendence—of permanent strength and durability.

The concrete itself played a part as important as the steel, and the variation in the strength and elasticity of this material under different conditions had sometimes been overlooked in the theoretical study of the combination of concrete and steel.

Concrete structures, when reinforced with iron or steel rods properly placed, developed a capacity for carrying loads or resisting strains several times greater than would be the case without reinforcement. It was evident that the position and nature of the reinforcement in the structure must conform to the principles of mechanics, so that the concrete should be strengthened in its weakest part; and, as concrete was comparatively weak in its resistance to tension and shear, the reinforcing metal should be placed where it would aid the concrete in carrying these stresses.

The position of the metal would vary according as the parts of the structure were in compression or tension; in beams, it should be as near to the surface on the tension side of the beam as was consistent with properly embedding it and providing a sufficient thickness of concrete to protect it from the heat or weather, and to ensure that the stretching of the tension surface did not result in the formation of cracks in the concrete.

As concrete was a comparatively brittle material, and steel a ductile one, it was not only necessary to have a proper quantity of metal in the structure, but it must be correctly located, and of good quality.

Professors Talbot and Turneaure (America) both concluded that the tensile strength of concrete might be disregarded in the consideration of the ultimate load carried by a beam. This agreed with actual practice, and with the regulations issued by the Minister of Public works of Germany in 1904. The tensile resistance of the concrete affected the deformation and deflection of beams under the smaller loads, but if, as was customary, the working strength was taken as a definite fraction of the resistance at the elastic limit of the steel, the tensile resistance of the concrete need not be considered in the design of reinforced beams.

The depth to which the steel rods should be embedded in the concrete, varied considerably, whether they were round, square, flat, or some patented irregular section or surface. In reinforced structures it was necessary to securely anchor the ends of the rods to prevent slipping of the steel, or by introducing stirrups, or other vertical or inclined reinforcements. The rods should not be spaced nearer together in the clear than the sum of their two diameters, and in no case less than 1½ in. apart, nor nearer than 1½ in. in either side of the concrete.

It was of the first importance that the concrete used in reinforced design should be composed of the best materials, properly proportioned, mixed, and packed.

The proportion of cement to the aggregate depended upon the nature of the construction and the required degree of strength or water-tightness, as well as upon the character of the inert materials, and as both strength and imperviousness increased with the proportion of cement to aggregate, relatively rich or fat mixtures were necessary for loaded columns and beams, for thin walls subjected to water pressure, and for foundations laid under water.

The systems more frequently used in this country were the Cottancin, Expanded Metal, Hennebique, and Monier, but these and some others were used considerably in the United States and the Continent of Europe.

The application of reinforced concrete to engineering designs was becoming more general in this country, but to nothing like the rate of progress which was being made in North America and Western Europe. The Government departments of Germany and the United States had acknowledged its reliability, advantages, and suitability for almost all structures; and, in the former country, rules and regulations to govern its use had been drawn up by the Department of Public Works. In this country most of the work executed in reinforced concrete had been carried out in one or another of the various systems in use, for companies or private individuals, who had not to apply to a government department for a loan to cover the cost of such work.

The adaptability of reinforced concrete for a building material was exemplified in numerous structures which not only from an engineering standpoint, but architecturally as well, were models of the builder's art. The fire-resisting qualities of reinforced concrete appeared, both from experimental and actual fire tests, to be superior to those of any other material; and, in fact, it was doubtful if, without reinforced concrete construction, it would be practicable to erect the sky-scraping structures which abound in the great cities of America, but, it was hoped, might never be seen in this country on the same lofty scale.

Reinforced Piling.

Mr. A. R. Galbraith, A.M.Inst.C.E., read a paper on reinforced piling. He said that, in addition to the usual advantages that were associated with the adoption of these constructions—for instance, fire-resistance, durability, homogeneity, economy, etc.—the use of these piles in submarine work ensured

immunity from the dreaded attacks of the teredo navalis and other boring pests that destroyed timber piles, and there was no serious oxidation of the metal to be feared, as in steel piles. One of their most important advantages was that, owing to their impermeability when properly constructed, they were equally durable in dry or wet soils, whereas in order to preserve timber piles they must be constantly submerged. Unlike timber and steel piles, they could be easily lengthened, shortened, jointed, altered, or repaired (the last being seldom necessary), and there were virtually no maintenance expenses, such as were connected with their timber or steel prototypes. Their most serious disadvantage was their first cost, although under favourable circumstances they would be found nearly as cheap as timber ones, and a great deal more economical than those of steel. Pile for pile, the cost would generally exceed that of timber; but often, however, their adoption would mean a saving in the ultimate cost of the work, especially in foundations, owing to the piles not having to be cut off below ground water-level, and the reduction of the excavation and in the volume of masonry. The concrete pile had also a much greater bearing capacity than the wooden one. In strata where a wooden pile 20 ft. long, 12½ in. diameter at the top, and 10 in. at the bottom would carry 17,000 lb., a concrete pile 20 in. at the top and 6 in. at the bottom would carry 65,000 lb. This was for plain concrete, and when to this the resistance of the reinforcement in the reinforced concreted pile had to be added, it would be at once perceived that the bearing capacity was considerably in excess of that of the ordinary timber one. They were also as elastic and as resilient as timber, a pile 14 in. square, 43 ft. long, suspended in the middle, giving a deflection of from 3½ to 4 in.; and they could be used for driving through strata of the most formidable character, standing a punishment that would absolutely wreck a timber pile. The ease and efficiency with which they could be connected to the reinforced concrete or other superstructure they had to support, and their freedom from vibration, owing to their monolithic nature, rendered them peculiarly adaptable for the foundations of piers and bridges, locks of docks, and other structures of a similar description, eliminating the heavy expenditure for cylinders, and, in the case of masonry piers, the indispensable, but expensive, cofferdams and pumping. In short, these piles comprised the advantages of timber piles, with some of the advantages of masonry piers, and the busy engineer would find by their adoption the solution of many problems not so easily or cheaply solved by the ordinary methods. Last, but not least, should be mentioned the facility with which the component materials could be procured or transported, and the economy of space when these piles were used for dock, quay, and wharf walls, together with the ease with which such structures could be suitably anchored by means of connecting tie-rods to anchor piles driven in the adjacent strata beyond the line of pressure of the superimposed filling.

Mr. J. Lemon (Southampton) in proposing a vote of thanks to the authors of the papers said he superintended the construction of some coal hoppers at Portsmouth in ferro-concrete on the Hennebique principle. The experience he gained was that the construction was slow in carrying out, and was not cheaper than other modes of construction; but, notwithstanding this, he was of opinion that ferro-concrete had come to stay.

Mr. J. T. Eayrs (Birmingham) was of opinion that great care should be exercised by engineers in the designing of these structures, and more particularly in the materials which were used in making up the concrete. He had had some conversation with the engineering staff of the Local Government Board, and had come to the conclusion that the Board was not very favourable to reinforced concrete.

Mr. Martin (Leeds), Mr. Bamber (London), Mr. A. D. Greatorex (West Bromwich), Mr. James (of Grays), and the President took part in the discussion on the papers.

The members visited the works of the Norwich Water Company, where they were received by Ald. Chamberlin (chairman) and Mr. Chas. Hawkesley (consulting engineer), under whose guidance the works were inspected. The Waterworks Company entertained the President and members of the Association to luncheon. In the afternoon the city depôt, the gasworks, and the castle museum were visited.

FIRE PROTECTION IN LONDON.

ON Friday of last week Mr. E. T. Hall, Vice-President of the Royal Institute of British Architects gave evidence, before the Committee of the House of Commons which has under consideration the London Building Act Amendment Bill and the Bill promoted by the City Corporation, on behalf of the governors of Dulwich College. From his experience of building matters in London he had, he said, come to the conclusion that the legislation of 1894 was still sufficient, and he could see no ground for the proposed alteration of buildings erected in accordance with the Act of that year.

Mr. Edward White, a member of the Building Act Committee of the London County Council, said that the Bill certainly required further consideration before it was made law. Witness, who spoke on behalf of the London Chamber of Commerce, considered that the Bill would press very hardly in the case of the majority of existing buildings.

On Tuesday last the Hon. J. D. Fitzgerald replied at great length on behalf of the London County Council, and the Committee deliberated in private.

On the re-admission of parties to the committee-room, the Chairman announced the decision of the Committee. He said that he would deal with the City of London (Escape from Fire) Bill first. The Committee decided that the preamble of the Bill had not been proved. With regard to the other Bill—the London County Council's Bill—the Committee decided that the preamble was proved so far as it related to escape from fire.

Some discussion between counsel ensued, and it was arranged that the clauses should be settled on Thursday.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

III.—AUDLEY END AND SAFFRON WALDEN.

IN brilliant weather, an excellent excursion was made on Saturday afternoon, 1st inst., to the famous XVIIth century mansion, Audley End, upon the occasion of the third summer visit. The subject is too well known to call for detailed reference, and there is a great amount of authoritative literature concerning its history within easy reach. It may be of interest to our readers to know, however, that we published a number of photographs of the exterior and interior on March 31, 1894, together with notes upon them, and we have, at various times, illustrated some of the more important internal details.

The setting of this stone house in leafy woodlands is both beautiful and dignified, while the scene is enhanced by the grass lawns and meadows, and by a river. By the courtesy of the owner the party of members of the Architectural Association were enabled to view the whole of the apartments. Great interest was aroused by the elaborate plaster ceilings, the banqueting hall, the two magnificent oak staircases in which a free use of the newel is predominant, the mantelpieces, the valuable collection of pictures, furniture, armour, and *objets d'art*. There was, however, one element in the whole which entirely marred the completeness of a great design—the glass in the windows. Here the original leaded lights had been removed to give place to sliding sashes with large panes of plate-glass, and the result is disastrous.

Saffron Walden, about a mile distant, was next visited. This little town teems with architectural interest. Foremost is the fine church, standing upon high ground, and containing many good monuments. Then the plastered fronts to the houses form a collection of a beautiful decorative process for which the eastern counties are still renowned. Many good brick façades of Georgian times are to be seen, and much modern work of a high order. Mr. Rickman designed the new spire to the church, while the half-timbered town hall is by the late Edward Burgess. A very interesting brick and stone building is "Gibson's Bank," by the late Eden Nesfield, who also restored the adjoining inn. The stone drinking fountain, by the late J. F. Bentley, has much to repay a careful study.

THE LONDON COUNTY COUNCIL.

THE first meeting of the London County Council after the Whitsun recess was held on Tuesday, in the County Hall, Spring-gardens, Mr. E. A. Cornwall, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee it was agreed to lend Camberwell Borough Council 12,000*l.* for paving and channelling works, and 5,000*l.* for contribution to cost of street improvement; Chelsea Borough Council, 5,000*l.* for wood-paving works; Finsbury Borough Council, 915*l.* for asphalte paving works; Islington Borough Council (sanction), 4,885*l.* for electric-light installation, and 15,304*l.* for electric-light installation and meters; Metropolitan Asylum District Managers, 100,000*l.* for various purposes; Paddington Borough Council, 5,816*l.* for reconstruction of Warwick-road bridge; and Stoke Newington Borough Council, 900*l.* for site for electricity station.

Site for New School, Brixton—The "Reay."—It was agreed to acquire the site for the school in Hackford-road, to be known as the "Reay" London County Council school.

Catford Bridges.—The Bridges Committee recommended that authority be sought in the session of Parliament of 1906 to enable the Council to reconstruct, in accordance with the plan submitted to the Bridges Committee on May 11, 1904, the bridge carrying Catford Hill over the South-Eastern and Chatham Railway Company's line; and that the application to Parliament be made dependent upon the Lewisham Metropolitan Borough Council contributing a sum, not exceeding 26,500*l.*, towards the cost of the work, on the understanding that, in the event of the total cost of the bridge being less than 53,500*l.*, the difference shall be deducted equally from the respective proportions of the cost to be borne by the Council and the Metropolitan Borough Council.

Proposed Footway Tunnel under the Thames.—They also recommended that authority be sought in the session of Parliament of 1906 to enable the Council to construct a footway tunnel to connect North and South Woolwich; and that, in the Bill, provision be made to amend section 16 of the Metropolitan Board of Works (Various Powers) Act, 1885, so as to enable the Council to make such modifications in the present ferry services as may be considered desirable.

Vauxhall Bridge.—Mr. Straus, in reply to Lieut.-Colonel Rotton, said the progress of the construction of Vauxhall Bridge still remained satisfactory, and there was every possibility of the bridge being completed by the end of the year.

On the recommendation of the Committee, the Council approved of an agreement with Mr. A. Drury, A.R.A., for the payment of 1,200*l.* to him for the modelling and casting of each of the eight panels for Vauxhall Bridge, the fee to include everything necessary to render the panels fit and ready for fixing.

Sir Melvill Beachcroft asked what kind of panels these were to be.

Mr. Straus replied that they were heavy bronze Pre-Raphaelite panels in high relief.

The Council, having transacted other business, adjourned.

APPLICATIONS UNDER THE LONDON BUILDING ACT, 1894.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses:—

Lines of Frontage and Projections.

Strand.—An iron and glass shelter at the entrance of the Gaiety Restaurant, Strand (Messrs. Jones & Willis, Ltd.).—Consent.

Westminster.—A one-story shop on part of the forecourt of No. 124, Victoria-street, Westminster (Messrs. Griffin & Woollard for Mr. J. B. Martin).—Consent.

Lambeth (North).—A mission hall with projecting steps thereto on a site abutting upon the northern side of Webber-street, and western side of Ufford-street, Lambeth (Mr. G. D. Stevenson for the trustees of the "Collingwood" Working Men's Mission).—Consent.

St. George, Hanover-square.†—Projecting bay windows and a porch to a building between Nos. 60 and 63 Grosvenor-street, St. George,

Hanover-square (Messrs. Balfour & Turner for Mr. J. Garlick).—Consent.

St. Pancras, South.†—Underground cellarage in the forecourts of Nos. 15, 17, 19, and 21, Euston-road, St. Pancras (Mr. W. Flockhart for Dr. Pavy).—Consent.

Brixton.—Retention of a showcase at No. 133, Clapham-road, Brixton (Mr. J. U. Davis).—Consent.

Camberwell, North.—One-story shops on part of the forecourts of Nos. 88, 90, and 92, Wyndham-road, Camberwell (Mr. R. Pettifor).—Consent.

Dulwich.—Buildings on a site abutting on the south side of Barry-road and east side of Lordship-lane, Dulwich (Messrs. Harrington & Ley for Mr. J. Redapple).—Consent.

Hammersmith.—A porch, bay window, and balcony at No. 36, Blomfield-road, Uxbridge-road, Hammersmith (Messrs. Macintosh & Newman for Mr. E. J. Clayton).—Consent.

Hammersmith.—A bay window at No. 65, The Grove, Hammersmith (Messrs. H. Chapman & Co. for Mr. M. Griffe).—Consent.

Hampstead.—A projecting lantern light over a portion of the area in front of the Palmerston-road baths, Kilburn (Mr. H. G. Legge for the trustees of the Wells and Campden Charity).—Consent.

Hampstead.†—Enclosures to a portico at No. 12, Belsize-square, Hampstead (Messrs. Bourchier, Burmester, & Galsworthy for Mr. J. Davis).—Consent.

Hampstead.—A bay window at No. 3, Wedderburn-road, Hampstead (Mr. V. H. King for Mr. F. E. F. Barham).—Consent.

Lewisham.—One-story shops upon part of the forecourts of "Rosebank" and Nos. 1 and 2, Blake-villas, Brownhill-road, Catford (Mr. W. M. Proudfoot for Mr. A. Blake).—Consent.

Newington, West.—Two houses, Nos. 39 and 40, De Laune-street, Kennington (Messrs. Briant & Son for Mr. A. F. De Laune).—Consent.

Norwood.—That the application of Messrs. D. Young & Co. for an extension of the periods within which the erection of buildings on the western side of Brixton-hill and New Park-road, Norwood, was required to be commenced and completed, be granted.—Consent.

St. George, Hanover-square.—Projecting stone balconies to new premises on the site of St. George's Chapel, Albemarle-street, St. George, Hanover-square (Messrs. Gale, Durlacher, & Emmett for Mr. G. Durlacher).—Consent.

St. George, Hanover-square.—The retention of an iron and glass covered way at No. 98, Knightsbridge (Mr. J. Tattersall).—Consent.

Westminster.—A bay window at No. 58, Ennismore-gardens, Westminster (Messrs. Flood & King for Mr. C. W. Parish).—Consent.

Woolwich.—A porch and verandah at "Findon," Southwood-road, New Eltham (Mr. R. Baker for the executors of the late R. C. Davis).—Consent.

Marylebone, East.—Projecting bay windows and a balcony at No. 80, Portland-place, St. Marylebone (Messrs. Boehmer & Gibbs for Matthews, Rogers, & Co.).—Refused.

St. George, Hanover-square.—The retention of a stone balcony and entrance porch at "Symond's Hotel," No. 34, Brook-street, St. George, Hanover-square (Messrs. G. Trollope & Sons and Colls & Sons, Ltd., for the Symond's Hotel Company).—Refused.

Brixton.—A one-story shop on part of the forecourt of No. 87, Bedford-road, Clapham (Messrs. Price, Arrow, & Taylor for County of London Estates Company).—Refused.

Hackney, North.†—An advertising hoarding in front of No. 4, High-street, Kingsland (Messrs. F. Matcham & Co. for the London Coliseum, Ltd.).—Refused.

Strand.—A projecting sign at No. 11, Wardour-street, St. James', Westminster (Mr. J. Richardson for Messrs. Sam Isaacs & Co., Ltd.).—Refused.

Woolwich.—A greenhouse at No. 10, Basildon-terrace, Basildon-road, Plumstead, to abut upon Cordite-street (Mr. J. O. Cook for Mr. C. W. Reynolds).—Refused.

Width of Way.

St. George-in-the-East.—A building upon a site abutting upon the east side of Splidts-street and south side of Ellen-street, St. George-in-the-East (Mr. A. Davis).—Consent.

Brixton.—Retention of a one-story office building at No. 175, Ferndale-road, Brixton (Mr. W. H. Duffield for Mr. D. Greig).—Consent.

Greenwich.—A house at No. 58, The Stowage, Deptford, with a forecourt boundary at less than the prescribed distance from the centre of the roadway of the street (Mr. J. Webster for Messrs. May & Roberts).—Consent.

Marylebone, East.—No. 97, Henry-street, St. John's Wood, with external walls at less than the prescribed distance from the centre of the roadway of Bentinck-court (Mr. A. J. Hopkins).—Consent.

Whitechapel.—A building at No. 18, Tenter-street East, Whitechapel, with external walls at less than the prescribed distance from the centre of the roadway of the street (Mr. G. H. Lovegrove for Messrs. Hyman & Son).—Consent.

Woolwich.—Deviation from the plan approved for the erection of houses with bay windows on the east and west sides of Back-lane (renamed Belford-grove), Artillery-place, Woolwich, and the widening of Back-lane, so far as relates to the erection of houses on the east side of Belford-grove (Mr. F. C. Henesy).—Consent.

Peckham.—Three buildings on the south side of Wagner-street, Peckham (Mr. J. P. Choate for Mr. B. Gale).—Refused.

Chelsea.—A motor shed at the rear of No. 31, Cadogan-place, Chelsea, with external walls at less than the prescribed distance from the centre of the roadway of Little Cadogan-place (Messrs. Allen & Mannooch, Ltd., for Mrs. Eliot).—Refused.

Fulham.†—Four dwelling-houses between Nos. 27 and 32, Caroline-place, Lillie-road, Fulham (Mr. H. Curzon for Mr. B. Rohls).—Refused.

Brixton.—A building at the rear of No. 1, Bellefields-road, Brixton, with external walls at less than the prescribed distance from the centre of the roadway of a street at the rear of those premises (Mr. G. Guy-Rogers for Mr. F. Prebble).—Refused.

Southwark, West.—A block of working class dwellings on the eastern side of King's-court, Southwark (Mr. A. Burr for the Jolly Trust).—Refused.

Width of Way and Lines of Frontage.

Dulwich.—An addition at the rear of No. 184, Camberwell-grove, Camberwell, to abut upon Stories-road, and of a bay window in front of such building (Mr. A. Laycock).—Consent.

Hampstead.—An entrance porch at "West Heath Lodge," Branch-hill, Hampstead (Mr. W. T. Farthing & Son for Mr. M. Kuehn).—Consent.

Lines of Frontage and Space at Rear.

Hampstead.—A stable building, with an irregular open space at the rear, and the erection of brick and oak porches to two houses on the west side of Bracknell-gardens, Hampstead (Mr. J. D. Hunter for Mr. J. Wilson).—Consent.

Lines of Frontage and Construction.

Finsbury, East.—An iron gangway across Basterfield-street to connect the third floor of premises on the north side of that street with the third floor of No. 6, Bayer-street, Golden-lane, St. Luke's (Mr. J. Groom for Messrs. Pearks, Ltd.).—Consent.

Width of Way, Line of Frontage, and Space at Rear.

Lambeth, North.—Three cottages on the western side of Over-place, Lambeth, northward of No. 92, Princes-road (Messrs. J. A. J. Woodward & Sons for Mr. G. Brittain).—Refused.

Width of Way and Construction.

Whitechapel.—An iron and glass shelter over a portion of a yard abutting upon the north side of Fashion-street, Whitechapel (Messrs. Still, Wheat, & Luker for Messrs. Scammell & Nephew).—Consent.

Width of Way, Line of Frontage, and Construction.

Poplar.—The erection over a street leading out of the west side of Emmett-street, Poplar, of an iron gangway and overhead traveller to connect the premises of Messrs. Venesta, Ltd., with the premises of the Aberdeen Steam Navigation Company (The Fireproof Co., Ltd., for Messrs. Venesta, Ltd.).—Refused.

Space at Rear.

Bethnal-green, South-West.—That Messrs. Joseph and Smithem be informed, in reply to their request on behalf of the Four Per Cent. Industrial Dwellings Co., Ltd., that the Council should declare that a disused burial ground at the rear of the site of proposed buildings on the eastern side of Brady-street, Bethnal-green, is secured permanently or to the satisfaction of the Council as an open space by covenant or otherwise, that the Council is of opinion that such disused burial ground is such an open space as is contemplated by section 41 (1) (iii) (*h*) of the London Building Act, 1894; and that moreover the Council is satisfied that the maintenance of such burial ground as an open space is secured in accordance with such section.—Consent.

Lewisham.—A modification of the provisions of section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of two houses on the western side of Salehurst-road, Crofton Park, Lewisham, with irregular open spaces at the rear (Mr. H. Lilly-white).—Consent.

Dulwich.—A modification of the provisions of section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a building on a site abutting on the south side of Barry-road and east side of Lordship-lane, Dulwich (Messrs. Harrington & Ley for Mr. J. Redapple).—Consent.

Fulham.—A modification of the provisions of section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a shop with dwelling-house over on the western side of High-street, Fulham, adjoining the "King's Head" public-house (Messrs. Brown & Barrow for Messrs. Charrington & Co., Ltd.).—Consent.

Wandsworth.—A modification of the provisions of section 41 with regard to open spaces about buildings, so far as relates to the proposed erection of seven houses on a site abutting upon the northern side of Wimbledon-road and southern side of Garratt-lane, Wandsworth, and the erection of a house on the northern side of Wimbledon-road next St. Mary's churchyard (Mr. G. Pinkerton for Mr. A. W. Iles).—Consent.

Deviation from Certified Plans.

Paddington, South.—Deviations from the plan certified so far as relates to the proposed rebuilding of Nos. 7 and 8, Polygon-mews, Paddington (Mr. L. E. G. Collins for Mr. L. Filmore).—Consent.

Hampstead.—That an order be issued to Mr. O. E. Winter, sanctioning the formation or laying out of a new street for foot traffic only, to lead from Sarre-road to Gondar-gardens, Hampstead (for the Council of the Metropolitan Borough of Hampstead).—Consent.

Hampstead.†—That an order be issued to Mr. F. Hingston refusing to sanction the formation or laying out of a street for foot traffic only to lead from High-road, Kilburn, to Kilburn-priory (for Mr. W. Stephens).—Refused.

The recommendations marked † are contrary to the views of the local authority.

ARCHÆOLOGICAL SOCIETIES.

WORCESTER DIOCESAN ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.—The first summer excursion of this Society took place on the 20th ult., a start being made from Shrub Hill. Shipton Station was reached at about noon, and brakes conveyed the party to the church, where the vicar (the Rev. W. Collingwood Carter) was in readiness to point out the many features of interest in Shipton Church, which consists of nave, with side aisles, large chancel, south porch, with chamber over, and an Early English tower and spire. North and south of the tower are remains of two narrow Norman aisles, which have now given place to late XIVth century aisles, that on the south side being wider than the nave, while the east portion is considerably earlier, and was probably originally a transeptal chapel, when the church had not assumed its present ample dimensions. The font and pulpit are both good examples of early XVth century stonework. There is a curious palimpsest brass in the north chancel aisle, a mutilated early XIVth century effigy of a lady placed in one of the two canopied sepulchral recesses, which, however, is too small for it, and a curious little monument, without name, on the south side of the sanctuary. A drive of four miles over a Cotswold ridge, and through what was once the forest of Wychwood, brought the party into the Windrush Valley, where Swinbrook Church was soon discovered, perched on its little hill. On approaching the church the small early XIXth century tower and the large perpendicular east window arrest attention. On nearer approach the square-headed windows on the north side reveal a quantity of ball-flower ornament. The interior is a good specimen of a small church, with side aisles and clerestory, but is chiefly remarkable for the Fettiplace monuments, which occupy nearly the whole of the chancel walls, and two good brasses on the sanctuary floor. One of the Early English nave arcade capitals is remarkable for its ornamentation, which suggests a XIIIth century edition of Roman work, and which the mediæval artificer may have seen in a Roman villa, perhaps at Widford, close at hand. Widford must be visited to be appreciated. Built on the site of a Roman villa, its chancel floor is still partly composed of tesselated pavement. Frescoes cover the walls, the subjects including a S. Christopher, the Three Kings in life and death, the latter being crowned and sceptred skeletons, both subjects dear to our mediæval forefathers, and other subjects are still clearly distinguishable. The pulpit is the original XVth century wooden one. This little building is now being repaired with the greatest reverence and care. A two-mile drive brought the party into Burford, the church and priory being visited. The little church of Fullhook, with its fine Early English porch and remarkable nave arcade capitals, was visited on the return to Shipton Station, which was reached in time to catch the 7.15 train, arriving at Shrub Hill at 8.47.—*Worcester Herald.*

ENGINEERING SOCIETIES.

SOCIETY OF ENGINEERS.—The President and members of the Society, on Wednesday, June 28, visited the Lots-road Electric Power Generating Station of the Underground Electric Railways Company, of London. The building is 453·5 ft. by 175 ft. and 140 ft. in height from the ground floor to the peak of the boiler-house roof. The office building adjoining on the east measures 81 ft. by 25 ft., and has three floors, the lower of which forms the machine shops. The main building has a self-supporting steel frame weighing about 6,000 tons. There are four chimneys, each 19 ft. internal diameter and 275 ft. high; the foundations for these chimneys are 42 ft. square and 34 ft. 6 in. below the ground-floor level. There are 2,200 cubic yds. of concrete in each foundation. The electrical capacity of the building at normal load is 57,000 k.w. The steel frame of the building is enclosed with brick and terra-cotta. The roof and all the floors are concrete except the engine-room, which is floored with checkered steel plates. In general details the building is considered as a factory for the producton of a commodity, and there are no ornamental features. The south side of the building contains sixty-four water-tube boilers arranged two stories high and carried directly on the steel frame of the building. Floor space is available for sixteen additional boilers. Each boiler has 5,212 sq. ft. of heating surface and 672 sq. ft. of superheating surface. The boilers are piped in groups of eight, each group supplying the steam for one electric generating set and one feed pump, there being no steam connexions between the several groups except that a supplemental header at the east end of the building is connected to two groups. This header supplies the exciter engines, air compressors, house pump, etc. The chain grate stokers under each boiler have 83 sq. ft. of surface. Economisers, with tubes 10 ft. long and placed wider apart than the usual practice, are grouped behind the boilers, with the customary bye-pass flues; 1,540 sq. ft. of heating surface is provided for each boiler. Boiler feeders are placed on the ground floor, and supply ring mains on both the boiler-room floors. The main generating sets consist of a horizontal turbine engine running at 1,000 r.p.m., and a three-phase generator wound for 11,000 volts 33⅓ cycles; there are eight such sets, with floor space for two more of the same size, and one of half the size. The normal rating of each generator is 5.500 k.w., but they will carry an overload of 50 per cent. for two hours at practically the same steam consumption per k.w.h. There are four 125 k.w. 125 volt steam-driven exciter sets running at 375 r.p.m. The condensing system consists of vertical condensers each with 15,000 sq. ft. of cooling surface; these are located in pits between the engine foundations. The circulating water is supplied by 66-in. pipes laid to the edge of the channel of the Thames. Each condenser has a 20-in. centrifugal pump; the duty of this pump is simply to overcome the friction of the pipes, as the system is arranged on the siphonic principle, the top of the condensers being within 29 ft. of minimum low tide, and the circuit is closed. The intake and discharge mains are arranged for reversible flow. The condensers are designed to work on the dry vacuum principle, the air pump and the water pump being separate. All the condenser pumps are driven by induction motors. The switch-board is carried on three gallery floors extending across the north side of the engine-room with returns across the east end. All high-tension engines are motor operated, and the feeder system extending to the twenty-three sub-stations is in duplicate. A line of sixty-four ducts is constructed to carry these feeders to the nearest point on the District Railway at Earl's Court. Coal is received on lighters in a tidal basin at the east end of the station, or by rail at an unloading point of the West London Extension Railway on the opposite side of Chelsea Creek. For unloading barge coal the basin is spanned by two travelling cranes, each working a 1-ton grab. Ashes are removed by an industrial railway worked by a storage battery locomotive.

INSTITUTE OF SANITARY ENGINEERS.—On Thursday, the 29th ult., by kind permission of Messrs. Doulton & Co., upwards of ninety members and students of the Institute of Sanitary Engineers visited the Royal Lambeth Potteries for the purpose of inspecting the manufacture of their sanitary specialities. After inspecting the pipe-making and the interesting process of junction sticking, the attention of the party was directed to the method of salt glazing. This process is not applicable to any other kind of ware than stoneware, as the glaze is really formed by the partial fusion of the clay itself. During the last stage of firing, when the ware is just on the point of vitrifaction, common salt is thrown into the kiln. The decomposition of the salt fills the kiln with dense fumes of salt vapour, producing on the wares a thin glass or glaze of silicate of soda. The testing of the drain pipes, by subjecting them to considerable internal hydrostatic pressure was then inspected, and also the process of furnishing sewerage pipes with Doulton's patent self-adjusting joint. Great interest was taken in viewing the various stages in the manufacture of Messrs. Doultons' famous art productions; the sculptural work of Mr. Geo. Tinworth, the grotesques of Mr. M. V. Marshall, and the etchings of the Misses H. B. and F. E. Barlow being much admired. After an inspection of the fine display of baths, lavatories, and other sanitary fittings in the show-rooms, the party dispersed.

SMOKE ABATEMENT REGULATIONS IN FOREIGN COUNTRIES.

IN fulfilment of a promise made by the Government to the advocates of smoke abatement, a circular was sent in May last to the representatives of His Majesty in certain foreign countries calling for reports respecting the laws in force in such countries "for the regulation, restriction, or prevention of the emission of smoke from factories and other business premises, and from private dwelling-houses." Reports have been received accordingly by the Secretary of State for Foreign Affairs, and have been presented, by the King's command, to both Houses of Parliament. We subjoin a brief extract from the reports:—

Austria.—No direct legislative measures exist at present, but the problem of combating the smoke nuisance has never been lost sight of, and is at present forming the subject of negotiations between the competent Government departments. The Minister of Railways has also taken steps to deal with the question by encouraging the introduction of appliances for consuming smoke in the case of locomotives both on the State and on private railways, but there is no immediate prospect of a satisfactory solution of the problem. The Statutory Law for Trades contains the following paragraphs:—"Sanction (of the sanitary administrative authorities) is necessary in the case of industries where furnaces, engines, or other motive powers are employed, or which are calculated to endanger or harm the surrounding neighbourhood by the emission of an injurious quality of smoke"; "such factories may not be erected until the necessary permission has been accorded"; in the case of all factories belonging to the above-mentioned category it is the duty of the administrative authorities to examine the harmful conditions under consideration, and to prescribe the necessary measures to be observed in the erection of the building, and to take especial precautions that churches, schools, hospitals, and other public buildings are not damaged in any way by the erection of these establishments." These provisions are strictly enforced with the object of diminishing as far as possible the evil arising from the emission of thick black smoke from chimneys, etc.

Bavaria.—There are no laws in force which have been framed with the specific object of regulating or preventing the emission of smoke, but smoke and soot are mentioned by the Imperial Civil Code among the nuisances which may be made the subject of legal action if material injury is done to the complaintant's property. Official authorisation is required for the establishment of any business likely to constitute a danger or a nuisance to neighbouring property. The police also have considerable control over the construction of chimneys, and can enforce such alterations as they consider necessary to prevent annoyance to neighbours.

Belgium.—No separate law exists having directly for its object the regulation, limitation, or prevention of the emission of smoke, but the laws relative to establishments classed as dangerous, unhealthy, or objectionable give power to the authorities to attach certain conditions to the licences they issue, notably as regards the prevention and the emission of smoke.

France.—There is no legislative enactment, but a series of police Ordinances has been published in Paris from time to time dealing with the subject. In 1854 an Ordinance required the owners of steam-engines to consume their smoke or to use fuel which would not produce more smoke than coke or wood, but this was found to be unworkable, as were some other Ordinances. As the result of an inquiry extending over some years the Prefect of Police published an Ordinance in 1898 prohibiting the prolonged emission of thick black smoke from industrial establishments. Six months were allowed to manufacturers to carry out the necessary improvements, but the police have refrained from a rigorous application of the regulations owing to the impossibility of finding an absolutely perfect apparatus for consuming smoke. Choice of fuel, care in stoking furnaces, well-constructed chimneys may contribute largely to the restriction of smoke, but cannot entirely prevent its emission. After stoking furnaces every morning, and after each successive stoking during the course of the day, the inspector allows an emission of smoke three times as long as that allowed in London under the law of August 5, 1891. Great difficulties were met with by the municipality in carrying out the regulations owing to the bad example set by many public buildings, the managers refusing to comply with the provisions of the Ordinance of 1898. The statistics show, however, a continued increase in the number of manufacturers who comply with the regulations. No regulations have been issued with regard to the emission of smoke from private dwelling-houses.

Germany.—There are no actual laws on the subject in force. For the erection of any new building or important alteration of premises, however, the permission of the local police authorities must be obtained, and special sanction is required for the erection of premises which, by their position or their nature, might cause considerable danger or annoyance to the owners or inhabitants of neighbouring property or to the public generally. Under these regulations due consideration is given to the question of the emission of smoke. There appears to be a consensus of opinion against direct police regulations on the subject. One of the main objections seems to be the difficulty of deciding as to what constitutes "black, thick, or continuous smoke," and the experiments that have been made in taking observations of smoke emissions from various points and in various conditions of the atmosphere have shown that it is exceedingly difficult, even for experts, to agree. It would be almost impossible to furnish police or other officers with the instructions necessary for their guidance. In the opinion of the Prussian Government the employment of proper firemen will go far to minimise excessive emissions of smoke. Against the emission of smoke from private dwelling-houses there are also no laws in force in Germany. Largely owing to the almost universal use of coal-dust bricks, and to a system of central heating, for which coke is generally employed, comparatively little smoke is emitted—certainly not sufficient to render it necessary for any legislative measures to be taken.

Hungary.—At Buda-Pesth chimneys used for boilers having a heating surface of 3 sq. metres or upwards, or for furnaces consuming 44 lb. of coal or more per hour, must be furnished with smoke-consuming appliances. The exact nature of these appliances is not prescribed, but they must be approved of by the engineering department of the municipality. The results obtained have not been commensurate with the expense incurred, and it is considered by experts that careful stoking, which is not at present enforced, would be as effective in preventing smoke as any apparatus yet discovered. As regards household fires, no regulations are required, as stoves are in universal use.

Italy.—The Department of Public Health is responsible for the control of the emission of noxious fumes from factories and other business premises in large towns. There are, however, no special provisions on the subject of smoke in Italian sanitary legislation. The Sanitary Law speaks in general terms of industries which diffuse unhealthy exhalations, and of industries which may be dangerous to the public health. Those in the first category must be established in the country and at a distance from inhabited houses. Industries in the second category may be carried on in towns or near inhabited houses, but with the precautions necessary for avoiding all danger to the public health. The question of the emission of smoke from chimneys is of very small importance in Italy, as the majority of Italian industries are established in the country outside towns, and continue to make increasing use of electric energy produced by water power.

Netherlands.—The only law that has any connexion with the subject is the Hinderwet of June, 1875, which deals with the conditions upon which factories and other buildings employing smoke, gas, or steam may be erected. One ground on which permission to erect may

be refused is "fear of nuisance, and the emission of foul or obnoxious smoke." There are various local regulations requiring chimneys to be heightened or altered in certain circumstances.

Saxe-Coburg and Gotha.—In the case of already existing premises where a nuisance is caused by the emission of smoke, the intervention of the police can be obtained and alterations in such premises be enforced, but compensation for the expense to which he may thereby be put can be claimed by the owner from the complainant. In regard to the erection of new buildings, whether private dwelling-houses or factories, it is enacted that "every fireplace must be connected with a chimney of the width required by the rules of construction. The lighting of fires must be so managed, and conducted through chimneys of such height and construction, that smoke, soot, or sparks may not escape in a manner calculated to cause a nuisance or danger to the neighbourhood. All premises exposed to special danger of fire, and of large extent, such as yards for storage of timber or building materials, must be situated at a certain distance from other buildings, or from special kinds of buildings, and in premises where some industry is carried on by which smoke or evil-smelling fumes are likely to be given off, it is forbidden to make openings from such buildings on to the street, through which these fumes would escape."

Saxony.—According to the General Building Law of 1900, care must be taken in the construction of any building that no serious inconvenience will be caused to adjoining properties by the escape of smoke and soot. There are strict regulations as to the construction and height of chimneys. The stoking of furnaces must be so managed that adjoining properties suffer as little as possible from the emission of smoke or soot. A by-law in force in Dresden provides that, in private dwelling-houses, the heating arrangement must be so contrived as to produce as little smoke and soot as possible.

Switzerland.—The question of the abatement of smoke has never yet been raised, and consequently no legislation bearing upon it more than upon any other possible form of nuisance connected with the working of factories has been enacted. The factories are, to a large extent, driven by water or electric power, and consequently give rise to few, if any, complaints on the ground of smoke nuisance.

United States.—There is no general legislation in the State of Pennsylvania on the subject of smoke abatement, but the larger cities and other municipalities have, in some cases, adopted local regulations controlling the matter. At Pittsburg there is a total absence of regulations. The Mayor states that an Ordinance was issued, but that the Courts have declared it to be unconstitutional, and that no further action has been taken. At Philadelphia there is an Ordinance to regulate the smoke from chimneys, stacks, flues, or open spaces within the city. This Ordinance provides a colour scale for the measurement of the degree and darkness of smoke, making it unlawful to permit the escape of smoke of certain degrees of darkness, and fixing a penalty for the violation of its regulations. The City of Alleghany has an Ordinance, dated 1897, prohibiting the emission of dense smoke from engines, stacks, and chimneys within the city, but excluding from its provisions private residences unless using steam boilers. In New York City the Sanitary Code contains a provision that no owner, occupier, superintendent, manager, engineer, or fireman of any shop, foundry, manufactory, or premises where any busines is done, or in or upon which an engine or boilers or locomotives are used, shall cause, suffer, or allow smoke to escape or be discharged from any such building. In the City of Buffalo there is an Ordinance making it unlawful for any person or corporation to allow the discharge or escape into the open air of smoke, soot, etc., in such quantities or in such manner as to cause injury, detriment, or annoyance. The Smoke Ordinance of the City of Chicago came into effect in May, 1903, but has been amended several times since, and other amendments are expected. In dwelling-houses in Chicago very few ordinary fireplaces are used, the houses being generally heated by furnaces, for which only anthracite coal is employed.

HOUSING SCHEME, WINCOBANK, SHEFFIELD.—A meeting of the Housing Sub-Committee of the Health Committee of the Sheffield Corporation was held at the Town Hall, on the 29th ult., when it was decided to recommend to the Council that the plan of Mr. H. L. Paterson, the successful competitor in the recent architect competition for the erection of twenty houses at High Wincobank, be accepted, and to accept the tender of Mr. Nathhouse, builder, for the erection of the houses at a cost of 2,520*l*.

THE TRIBUNAL OF APPEAL UNDER THE LONDON BUILDING ACT.

ON Friday last week the Tribunal of Appeal consisting of Messrs. Penfold, Gruning, and Hudson, sat at the Surveyors' Institution, Great George-street, to hear an appeal made by Mr. Cunningham Glen (instructed by Mr. R. Barnes, solicitor), on behalf of Mr. Loftus Henry Canton, under section 13 (4) of the London Building Act, 1894, against the determination of the London County Council, dated April 18, 1905, to grant an application for consent to allow the erection of a boundary wall on the south-west side of the playground of the New End School, Hampstead, at less than the prescribed distance from the centre of the way as submitted by the Education Committee of the London County Council as not complying with the provisions of section 13 of the said Act. Mr. Andrews, for the Solicitors' Department, represented the London County Council.

Mr. A. W. Hudson asked what the position was with regard to the County Council giving consent. Did it apply to itself for its own consent.

Mr. Andrews said the Education Committee applied to the Building Act Committee for its consent, and the Building Act Committee recommended the Council to grant the consent. It was a most peculiar position. If any other procedure were suggested no doubt the Council would willingly accept it.

Mr. Hudson said the point covered the question of jurisdiction.

Mr. Andrews said he had a preliminary objection. The representative of the Education Committee who made the application to the Building Act Committee was not aware at the time he made the application that the defunct School Board had, subsequent to acquiring the site, obtained from the District Surveyor a certified plan showing all the buildings on the site and all forecourts, fences and walls, including this particular wall which was the subject matter of the appeal. The building, as proposed to be erected, would not occupy any land within the prescribed distance which was not formerly occupied by buildings as shown on the plan. That being so, his contention was that the School Board would have been able to rely on their certified plan, and the consent of the London County Council would not be necessary. That being so, he submitted that there was no jurisdiction of the Council to give consent, for the consent which was obtained was not necessary; because whatever the result of it might be they would be entitled to keep the wall in exactly the same position as it was now.

Mr. Glen disputed the statement that the Education Committee would only occupy land that was occupied by buildings before.

The Tribunal overruled the objection.

Mr. Andrews contended that the Council could make a valid order sanctioning itself doing something as a builder in the same way that the ordinary builder might be sanctioned.

Mr. Hudson: Then you claim it is a good order?

Mr. Andrews said it was in that sense, but he did not waive what he had said before that it was made under a mistake, and that there was no necessity.

Mr. Hudson said it was not the order but the application which was made under a mistake.

Mr. Glen said that had the facts been known to the County Council they would have said: "This order is not necessary, and we won't make it." What he wanted was to get rid of the consent so that he would not be estopped hereafter.

Mr. Andrews said his contention was that the order was valid, but the application was made under a mistake.

Mr. Hudson said the application of the Education Committee was to be allowed to put up a wall, but from the plans there appeared to be a wall there already.

Mr. Andrews said they were going to pull that down and build up another.

Mr. Hudson pointed out that the application was in somewhat extraordinary language; it was to erect a line of boundary, and they did not ask to erect a wall.

Mr. Andrews said it was merely a boundary wall. No part of the building was to be erected on the line marked on the plan. The inside space would be a playground.

Mr. Hudson said he understood that the new wall would be exactly on the site of the old wall except at one end, where there were once railings and now a hoarding. Apart from the question of law, what was the objection?

Mr. Glen said the objection was this: If the road was not widened by the wall being put back to the prescribed distance from the roadway, then his client, who owned the land on the other side of the roadway, would be forced by the County Council, when he developed the land, to widen the road to 20 ft.

Mr. Andrews said the Act could only make Mr. Canton go back the prescribed distance.

Mr. Glen said even in that case his client was prejudiced, because if he wanted the road widened he would have to sacrifice his own land, unless the County Council were obliged to go back the prescribed distance.

Mr. Hudson asked what was the effect of the County Council's consent. Was it not to enable the Education Committee to build all over the site?

Mr. Andrews said that was not the case. When the site was acquired it was the intention to erect a caretaker's house, and this would have necessitated the consent. The idea of erecting this house was abandoned so as to leave more room for the playground, and so there was no reason for giving any consent at all.

Mr. Glen said that they could fight the County Council elsewhere as to whether they were doing more than they were entitled to do, but their hands would be tied if the consent to erect this wall was allowed to stand.

Evidence was then called by Mr. Glen to prove that the roadway between the proposed boundary wall of the school and the property owned by Mr. Canton was a narrow passage and required widening in the public interest.

Mr. Penfold asked why the parties did not agree to a widening.

Mr. Canton said he was prepared to do his share of the widening when he developed his property.

Mr. Andrews said that at present the local authority saw no necessity for such widening. After all, if hereafter a widening was required, it would only mean setting back the wall. He argued that if the Tribunal came to the conclusion that the consent should not be granted then the Council could still be able to stand on their legal rights, and there was no question but that they could retain the wall on its present lines.

Mr. Hudson asked Mr. Andrews if he was not going to call rebutting evidence to that given by Mr. Glen as to this passage being a nuisance.

Mr. Andrews said he was not prepared to do so. He did not know that he had to meet a case of nuisance.

Mr. Hudson said it was not only a case of nuisance but of perpetuating a narrow thoroughfare. He would have thought that Mr. Andrews would have called evidence to show that the traffic through the passage was not such as to make a widening material.

Mr. Andrews said he preferred to rely on the local authority with regard to the necessity of widening.

The Chairman announced, after consideration, that the Tribunal had resolved to reverse the decision of the County Council dated April 18, 1905, consenting to the erection of the boundary wall at less than the prescribed distance from the centre of the roadway.

Illustrations.

COMPETITION DESIGN FOR WESLEYAN HALL, WESTMINSTER.

IN this competition the question of the position and shape of the large hall dominated the whole scheme, and in the first and second set of drawings submitted by me this hall was placed on the first floor, and the shape based on the ordinary theatre plan.

A serious attempt was made to provide a number of offices available for letting purposes; these were placed next Tothill-street, where they would command the best light and highest rentals, and were designed so that they could be included in the Wesleyan Connexional offices as and when required.

In the original and revised conditions the conference-hall or reception-room was desired to be "placed in proximity to the great hall," therefore it was designed by me as a vestibule to the large hall, and also capable of being used as a private room.

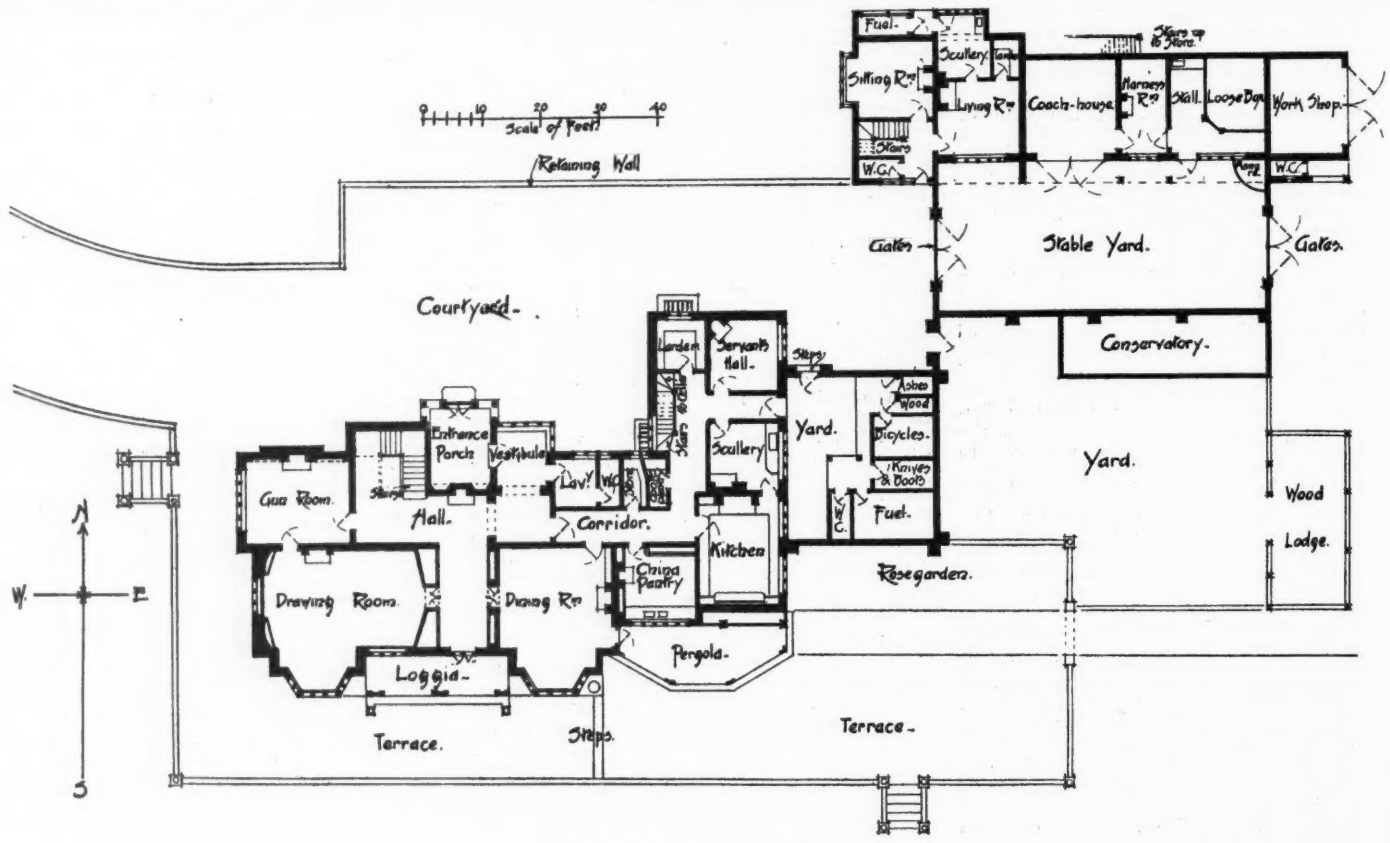
The elevations and detail should be considered as suggestive sketches only for an important work; the time required for a complete and exhaustive study of the treatment of a building of this size and character is more than any architect could reasonably expend on a competition design.

The cubical contents of these buildings amounted to 2,560,000 ft., and the cost was taken at 1s. 1d. per ft. cube, making a total cost of 138,667*l*., exclusive of decorative carving, mosaics, and painting.

JAMES S. GIBSON.

NEW PREMISES, BURY-STREET.

THE building here illustrated is situated on the east side of St. James's-street, adjoining Boodle's Club, and has a back frontage in Bury-street. The building is constructed of fire-resisting materials throughout. The front elevation in St. James's-street is composed of one story of granite, and the upper stories in Portland stone; the caps and bases to the



"Ardmillan," Sussex. Plan.

pilasters in the front entrance are bronze. The elevation in Bury-street, shown in the illustration, is in Portland stone and red brick, with polished teak bays.

The building is designed with an entrance in St. James's-street, also one in Bury-street, the ground floor being laid out as shops. The upper stories are residential chambers, with kitchen service on the top floors in the Bury-street block. This block is connected with the St. James's-street block by a corridor on the first floor, thus giving the tenants in the Bury-street block the benefit of the St. James's-street entrance.

Every room in the building is connected by telephone communication with the service department and the hall porter's room on the ground floor.

The builders are Messrs. Howard & Co.; the lifts by Messrs. Waygood & Co.; electric light by Mr. Donnison Sillem; service telephones by Messrs. Hammond & Co.; carving by Mr. Geo. Hawkings; electric-light fittings by Messrs. Osler; ironwork by Messrs. Young & Co.; and heating apparatus by Messrs. Wontner, Smith, Gray, & Co. Mr. Leslie W. Green is the architect.

"ARDMILLAN," EAST GRINSTEAD.

THIS house was erected for the Rev. C. W. Payne Crawfurd, the principal feature of the property being a series of beautiful natural ponds extending below the terraces which overlook them. The view from the south extends over Ashdown Forest.

The facing bricks used for the house, lodge, and stables were obtained from Petersfield, Hants, the roofs being covered in old tiles, the whole of the external woodwork being of English oak, with the exception of the pergola, the beams of which are in larch. The walls surrounding the rose garden, etc., were carried out in local brick, roofed in old tiles, and the terrace walls in local stone and the same brick. The vestibule, hall to garden entrance, and staircase are panelled in white wood.

The fireplaces in the reception-rooms and hall were supplied and fixed by Messrs. Shuffrey & Co., of Welbeck-street, whilst the rest were supplied by the Teale Fireplace Company. Mr. A. W. Sclater, of Oxford-street, wired the house for the electric light. The septic tank was carried out by the Septic Tank Company, of London.

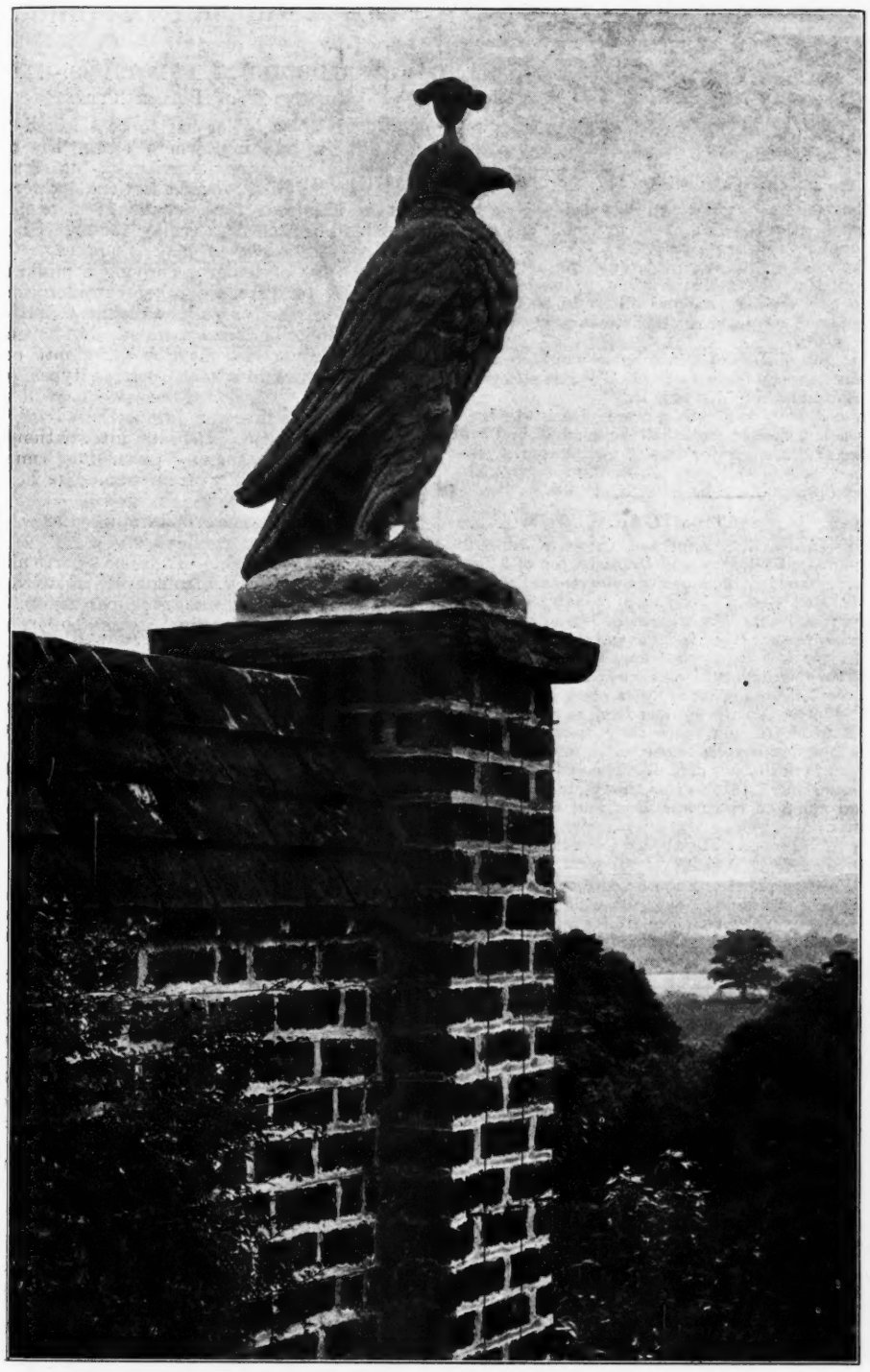
Mr. H. Young, of East Grinstead, was the builder, and the architect was Mr. E. Turner Powell, of Westminster and East Grinstead.

The pair of stone falcons mounted at the east end of the garden terrace are handsome and interesting reproductions of the family crest, and stood, until recent times, at the entrance gates of Ardmillan, near Girvan, Co. Ayr, an ancient estate, which came, about the year 1653, to Mr. Crawfurd's lineal ancestor, Major James Craufuird, of Baidland, Co. Ayr, through his marriage with Miss Kennedy, of Ardmillan, and remained in the Crawfuird family till 1876, when it was sold on the death, without male issue, of James Crawfuird, Lord Ardmillan, who was Solicitor-General for Scotland, 1853-5.

It was from Ardmillan, Co. Ayr, that Mr. Crawfurd's lineal ancestor, John Crawfurd (afterwards messenger to the Great Seal), migrated into Sussex about the year 1725, and built Saint Hill, in East Grinstead, which remained the seat of this branch of the family for many generations, and where Mr. Crawfurd, the only surviving son of the late Robert Crawfurd, of Saint Hill, J.P. and D.L., himself was born.

The age of these stone falcons is not known, but, judging from the appearance of the stonework, they might, perhaps, be 150 years old, thus forming an interesting link with Ardmillan, N.B., a house now largely modernised, but most picturesquely placed near the Ayrshire coast, and still retaining vestiges of its former glories.

"Ardmillan": Back View Showing Position of the Hawk Finial Figures on Wall.



One of the Hawk Finials at "Ardmillan."

SCULPTURE AT THE ROYAL ACADEMY.

WE have devoted one page this week to Mr. A. Bertram Pegram's fine group under the title "Endymion," in the central hall. In reviewing the sculpture of the year, we remarked that the sculptor had taken a new view of the legend, according to which Endymion was supposed to be kissed by Diana in his sleep: however, we see that the treatment is justified by Keats in a line which should perhaps have been quoted in the catalogue:—

"——and knelt adown
Before his goddess, in a blissful swoon."

The four subjects on the other page are "The Long, Long Dreams of Youth" (A), by Mr. Harold Parker; "The Charmed Circle of Youth" (B), by Miss Esther M. Moore; "Maternity" (C), part of a memorial to Queen Victoria to be erected at Nottingham; and "Hebe" (D), by Mr. Mervyn Lawrence, a life-size figure which stands in the lecture-room.

"TREATMENT OF SEWAGE."—Mr. A. S. Goodridge writes, in reference to his letter under this heading in our last issue (page 14 *ante*), that in the second column, 4th line, "ferro-culture" should be "terra-culture," and in last paragraph but one "ash pits" should be "cess pits." We must say that in the first case it is entirely the fault of the writer's MS.

LONDON BUILDING ACTS (AMENDMENT) BILL.

AT the meeting of Lambeth Borough Council, the General Purposes Committee reported that the London County Council had forwarded for consideration a copy of its proposals for the amendment of the London Building Act, and had asked to be furnished with the observations of the Council upon such proposals. The Committee had also received from the Council of the Royal Borough of Kensington a memorandum containing observations and suggestions of that Council upon the proposals. The Kensington Council strongly favours the transference of duties from the London County Council to the local authorities, and considers that the whole question of the amendment of the Acts is one which should be reported on by a Royal Commission, and that any amending or consolidating Bill should be introduced as a public measure by the Government on lines to be indicated by such Commission. The Committee held that the Council should support the opinion of the Kensington Borough, and they, therefore, recommended that a resolution be passed in the following terms, namely:—

"That, in the opinion of the Lambeth Borough Council, the London County Council should be relieved, as much as possible, by the transference to the Metropolitan City and Borough Councils of all duties that can be efficiently discharged by the latter bodies; and that the whole question of the amendment of the London Building Acts is one which should be reported upon by a Royal Commission; and that any amending or consolidating Bill should be introduced as a public measure by the Government, and not as a private Bill by the London County Council."

This was agreed to.

The Building Acts Special Committee of Camberwell Borough Council reported on Saturday having considered communications from the London County Council, the Surveyor to the Rolls Estate, the Kensington Borough Council, the London Chamber of Commerce, and the Musical Instrument Trades' Protection Association. After full consideration of the circumstances of the case, the Committee held that no good purpose would be served by considering the question until the definite proposals of the London County Council are embodied in a Bill in November next. They had therefore adopted the following resolution:—"That the London County Council be informed that this Council has no observation to make upon the present suggestions, but will consider the whole question when the complete Bill is received, and that the Kensington Borough Council, the Surveyor of the Rolls Estate, the London Chamber of Commerce, and the Musical Instrument Trades' Protection Association be informed accordingly."

The General Purposes Committee of Lewisham Borough Council reported on Monday having further considered the subject of the London Building Acts (Amendment) Bill. They had received a report from the sub-committee appointed by them. This sub-committee stated that, having regard to the complicated state of the law relating to buildings in the metropolis, they are of opinion that the law should be codified, and that evidence should be taken by a Royal Commission with that object, and they submitted the following resolution, which the Committee had confirmed:—

"That as the London Building Act of 1894 is already complicated by the amendments of the Act of 1898, this Committee is of opinion that a new Building Act for London—codifying the present laws with such amendments as may be deemed desirable therein—should be formulated, but before any such Bill is drafted the whole question should be reported upon by a Royal Commission, in order that the views of the London County Council, the Corporation of the City of London, the Council of the City of Westminster, and the several Metropolitan Boroughs, also the various professional associations connected with building work, may be ascertained and considered."

The Wandsworth Borough Council has received a letter from Messrs. Pratt Brothers calling attention to clauses which have been added to the London Building Acts (Amendment) Bill, which provide that where any part of a building used or adapted to be used as a shop, projects for a distance of 5 ft. or more beyond the main front, side, or rear of any building of which it forms part, and in which any persons are employed or sleep, the projecting portion of such shop shall be provided with a roof constructed of fireproof materials; that an enclosed fireproof staircase shall also be constructed from the upper part of such shop to the street; that where shops do not project and twenty persons are employed therein, a fireproof staircase shall be provided, and that skylights shall not exceed one-tenth part of the area of the roof on which they are placed, and be within 6 ft. of any party wall; stating that should the Bill become law, probably two-thirds of the retail drapers in London would be called upon to carry out the required alterations, which would be very costly, and in many cases practically impossible; and asking for the influence and support of the Council in opposing the Bill. The letter is to be considered by a Committee of the Borough Council.

The General Purposes Committee of Bethnal Green Borough Council reported on Monday having considered a communication from the London County Council asking for the observations of the Council on the proposals contained in the London Building Acts (Amendment) Bill. The Borough Surveyor had reported to the Committee on the proposals contained in the most salient provisions of the measure, especially those which affect local authorities. It appeared that several proposals of the County Council are of a drastic nature, and do not sufficiently safeguard the interests of the borough councils. In consequence, it seems desirable that any Bill introduced on the subject should be a Government measure. The Committee think it expedient that evidence should be obtained from the several authorities concerned in carrying into effect the provisions of the London Building Acts, and that the question should be reported upon by a Royal Commission. They had, therefore, passed the following resolutions:—

"(1) That any Bill regulating buildings in London should be introduced as a Government measure after the whole question has been reported upon by a Royal Commission, who should obtain evidence from the London County Council, the Corporation of the City of London, the Councils of the City of Westminster, and of the Metropolitan Boroughs, the District Surveyors, and the several professional associations connected with building work in London. (2) That in any new measure, the London County Council should be relieved as much as possible by transferring to the City and Borough Councils all duties that can be efficiently discharged by the latter bodies in accordance with the views expressed by the Royal Commission in 1894."

The Highways Committee of Shoreditch Borough Council reported having considered

the communication from the London County Council with regard to the London Building Acts (Amendment) Bill. The Committee had received a further report from the Borough Surveyor to the effect that a comparison of the Bill now proposed with that which was recently withdrawn from the consideration of Parliament reveals practically no alteration therefrom, and that the London County Council still seek to interfere with the present powers of the Metropolitan Borough Councils, and have not consolidated the existing Acts of 1894 and 1898 into one Bill, nor relegated any of the duties to the Metropolitan Borough Councils as suggested by them in conference. The Committee therefore had resolved:—

"That the London County Council be informed that this Council have no suggestions to make beyond those which were contained in their Borough Surveyor's report, dated February, 1905, and that a copy of such report be forwarded to the London County Council."

BOOKS RECEIVED.

GARDEN CITIES, IN THEORY AND PRACTICE. By A. R. Sennett, A.M.Inst.C.E. (A. R. Bennett. 21s.)

PRACTICAL PLUMBERS WORK. Edited by Paul N. Hasluck. (Cassell & Co. 2s.)

THE PRINCIPLES OF DESIGN. By G. Woolliscroft Rhead. (B. T. Batsford. 6s.)

RESIDENTIAL FLATS OF ALL CLASSES. By Sydney Perks, F.R.I.B.A. (B. T. Batsford. 21s.)

Correspondence.

TRAMS OVER THE BRIDGES.

SIR,—Referring to recent reports upon this matter, there is no questioning the present congested state of the traffic at the foot of Blackfriars Bridge, where the traffic of five streets converge, viz.—Queen Victoria-street, Upper Thames-street, New Bridge-street, and the Embankment and the bridge, and the importance of preventing an augmentation of the block at this point by including the tramways.

Undoubtedly it is a most awkward matter to regulate the traffic at this point, and it would be impossible for the trams to get from the Embankment on to the bridge without an enormous amount of trouble, and causing delay and stoppage of the traffic as matters now exist.

The widening of the bridge as suggested will be a costly undertaking, and I think the difficulty can be overcome without so large an expenditure, and result in little or no interruption to the present traffic during construction. It is not so much the width of the bridge as the approach, as there appears to be sufficient room on the crown of the bridge when once clear of the obstruction at the approach, and an improvement might be effected by the regulation of the present traffic on the bridge by police supervision, thereby preventing the carmen wandering about out of the track, which I have noticed constantly causes a great deal of obstruction.

Seeing there are two important factors to consider, viz.—firstly, the cost of widening or rebuilding the bridge at, say, 200,000*l.*; and secondly, the delay consequent upon completing the circle tramway—say for a matter of two years—I therefore suggest that, instead of widening the bridge throughout, the approach from New Bridge-street, at the foot of the bridge on the west side, from a point at the rear of the fire-float up to the first buttress, be widened, and the tram track kept next the river, and reserve the portion on the north side, that is, next De Kaiser's Hotel, for light vehicles, such as carriages, cabs, motors, etc.

In this way the trams could pass on to the bridge with little or no obstruction to the traffic, and thus avoid the block at the point above referred to.

This arrangement would likewise relieve the pressure at this point by giving more space for the traffic to clear quickly.

The cost of this work would probably not exceed 10,000*l.*, and the time to execute the work say six months, and all could be finished and opened by probably Christmas next, or very soon after.

I might add that this scheme would tend to improve the entrance to the bridge; at all events it would in no way disfigure it.

In order to show this more clearly I have enclosed a sketch, and shall be glad if you will kindly find a space for this in your paper.

JOHN JAS. DOWNES.

BATH STONE.

SIR,—An article appeared in your June 24 issue entitled "Decay and Preservation of Stonework," in which an incorrect statement is made as to "Box Ground" stone, of which we are the sole proprietors. The statement is made that the quarries are nearly, if not wholly, exhausted. This is so absolutely untrue that my directors must take serious notice of it, and must ask you to have it immediately corrected, as we are having letters on the subject from our customers.

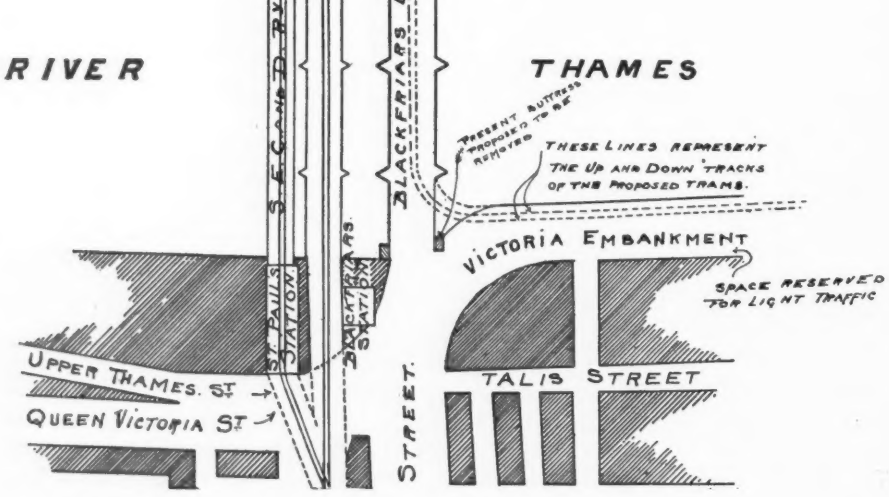
I shall write you more fully to-morrow, but to be in time for your next issue or article, I must ask you to notify our denial. The article is a very able one, and I think after this your contributor should come to Bath and Box and see facts for himself.

T. STURGE COTTERELL,
General Manager.

*** We may point out to our correspondent that the article is a signed one, for which we do not accept responsibility. See the first paragraph under the standing heading "To Correspondents."—ED.

SCHOOL, NEW ELGIN, N.B.—The new school which is being erected at New Elgin is now almost completed. The contractors were:—Mason, Mr. D. Forsyth, Elgin; carpenter, Mr. Thos. Mackenzie, New Elgin; plumber, Mr. John A. Russell, Elgin; slater, Mr. George Murray, Lossiemouth; plasterer, Mr. James Brodie, Elgin; painter, Mr. Wm. Fordyce, Elgin. The architects are Messrs. A. & R. M'Culloch, of Leith, whose designs were accepted in competition.

CHURCH-ROOM, NEWHAVEN.—The foundation was laid recently of a new church-room which is being erected in connexion with Christ Church, Newhaven. The ground floor of the main hall will be 72 ft. by 36 ft., and in the basement below will be a gymnasium, two classrooms divided by a movable partition, kitchen, cloakrooms, lavatories, etc. The main hall, which will accommodate about 500 people, will have an open roof, with wrought-iron principals. The front of the building will be in stock brick with red brick dressings. The architects are Messrs. Oakden & Hawker.



Plan showing Scheme for Junction of Blackfriars Bridge with Victoria Embankment.

The Student's Column.

STEAM-BOILERS AND PIPES.—II.

SELECTION OF BOILER TYPE.

WHEN a boiler has to be selected for a building where steam has not been used previously, or for a building where additional power or heat is required, the amount of floor area available is often a governing factor. Under such circumstances, it may be necessary to adopt a type of boiler occupying a minimum space, and to disregard other considerations.

Except in small sizes, the ordinary vertical boiler cannot be recommended, but special designs of this class may be taken into consideration. Combinations such as types (6), (7), and (8), mentioned last week, will be found of advantage, so far as the saving of space is concerned. Definite information as to the dimensions for any given duty can be obtained quite readily from numerous boiler makers.

For the purpose of facilitating the selection of boilers for confined spaces, we have summarised in Table I. some particulars given by Mr. C. E. Strohmeyer* relative to the weight of steam produced per sq. ft. of floor space occupied by steam boilers of different types.

Taking the largest size of each boiler in this table, we see very clearly the great economy of floor area to be secured by the marine type, even when the dimensions are kept within the limits necessarily imposed by railway companies. Next to this, in the same respect, come the dry-back tubular, locomotive, vertical, and watertube types, all within measurable distance of each other. The compound Lancashire is next on the list, while the ordinary Lancashire and the Cornish are at the bottom, the Cornish boiler requiring more than twice the space occupied by the smallest size marine boiler for a given steam production.

Taking the smallest sized boilers mentioned in the table, we find that Cornish, locomotive, and vertical boilers are extremely wasteful of floor space, and that the small Lancashire is very little better. The Lancashire tubular boiler shows more favourably in this case than in the previous comparison, while the dry-back and marine types head the list as before.

When a boiler has to be selected for a new building, or for an existing building where an extension of the boiler-house is possible, a wider range of apparatus is open for consideration, and the best type for adoption should be determined after various essential points have been made the subject of inquiry.

The following are the main factors governing the selection of a boiler type:—

(1) Suitability for the purpose for which the boiler is to be used, and for the conditions under which it is to be worked.

(2) Ratio of output to capital expenditure, including cost of seating chimney and boiler-house.

(3) Ratio of output to total expenses, including fuel consumption, attendance, interest on capital expenditure, and sinking fund.

(1) Where a boiler has to be worked continuously day and night with a fairly uniform load, the conditions are so simple that, so far as concerns the first consideration, any type of boiler may be employed.

In continuous working, however, it is absolutely necessary to duplicate the plant so that cleaning may be attended to at regular intervals without interruption of the service.

Where steam is required throughout the day and either none is required during the night or only just enough for maintaining the temperature of the building or buildings in cold weather, preference should be given to a boiler containing a large volume of water. Then the fires can be banked at the end of the day, and the water will store sufficient heat to keep the buildings warm until next morning without necessitating the expense of a night stoker. Even in summer time when steam is not required at night for warming purposes, the retention of heat in the water is advantageous, for it enables the attendant to get steam up to the normal pressure with very little trouble and delay.

* Manchester Steam Users' Association. Mem. by Chief Engineer, 1902.

TABLE I.—RATIO OF ESTIMATED STEAM PRODUCTION TO SPACE OCCUPIED BY VARIOUS TYPES OF STEAM BOILERS (*Strohmeyer*).

Type of Boiler.	Boiler Dimensions.		A. Boilers Surrounded by Flues.					B. Boilers Lagged.					Steam Production per sq. ft. of Floor Space.	
			Dimensions over Brickwork, 9-ft. Stokehold, and Valves 4 ft. high.					Dimensions over Lagging and 6-in. Clearance for Inspection, 9-ft. Stokehold, and Valves 4 ft. high.						
	Diameter.	Length.	Width.	Length.	Height above Floor.	Total Floor Space.	Water Evaporated per hour.	Width.	Length.	Height above Floor.	Total Floor Space.	Water Evaporated per hour.	A.	B.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	sq. ft.	lb.	ft. in.	ft. in.	ft. in.	sq. ft.	lb.	lb.	lb.
Vertical Cylindrical	3 0	7 0	—	—	—	—	—	4 8	9 9[5]	11 0	46	4·0	—	8·7
	6 0	15 0	—	—	—	—	—	8 0	12 9[5]	19 0	102	2,000	—	19·5
Cornish*	5 0	25 0	8 2	37 0	9 9	302	1,880	—	—	—	—	—	6·2	—
	6 0	28 0	9 2	40 0	10 9	367	2,700	—	—	—	—	—	7·4	—
Lancashire*	6 6	28 0	9 8	40 0	11 3	387	3 700	—	—	—	—	—	9·6	—
	7 6	30 0	10 8	42 0	12 3	448	5,100	—	—	—	—	—	12·0	—
	9 0	30 0	12 2	42 6	13 9	517	6,300	—	—	—	—	—	12·1	—
Lancashire Tubular	7 6	20 0	10 8	37 0[3]	12 3	395	5.800	9 3	37 0[3]	12 3	342	5,400	14·7	15·8
	9 0	20 0	12 2	37 0[3]	13 9	450	6,700	10 9	37 0[3]	13 9	398	6,300	14·9	15·8
Dry Back Return Tubular	9 9	9 6	12 11	24 6	14 1	317	5 800	11 6	24 6[6]	14 1	282	5 400	18·3	19·1
	11 0	8 9	14 2	23 9	15 4	337	6,700	12 9	23 9[6]	15 4	303	6 300	19·9	20·8
Marine Return Tubular	11 0[0]	9 3[0]	—	—	—	—	—	12 9	19 7[6]	15 4	250	5,800	—	23·2
	12 0	9 8	—	—	—	—	—	13 9	20 0[6]	16 4	275	6 700	—	24·3
	13 0	10 0	—	—	—	—	—	14 9	20 4[6]	17 4	300	8 700	—	29·0
	14 6	9 9	—	—	—	—	—	16 3	20 1[6]	18 10	326	10,000	—	30·6
Locomotive	2 9	9 6	—	—	—	—	—	4 5	24 6[3]	9 3	108	88	—	8·1
	5 0	13 6	—	—	—	—	—	6 8	28 6[3]	11 6	190	3,900	—	20·5
Babcock & Wilcox Water-tube Boilers	3 3[1]	19 0	8 3[2]	28 0	16 0	231	2,480	7 6[4]	28 0	16 0	210	2,480	10·5	11·6
	5 0[1]	23 0	10 0[2]	32 0	18 0	320	4,500	9 3[4]	32 0	18 0	296	4 500	14·1	15·2
	8 6[1]	23 0	13 6[2]	32 0	18 0	432	7,650	12 9[4]	32 0	18 0	408	7,650	17·5	18 8

* These types of boiler are not set without side flues.

[0] These are the dimensions of the largest marine boiler that can be sent by rail. [1] Width. [2] Width includes one 2-ft. side passage for tube sweeping purposes. [3] Length includes 6 ft. at end of boiler for tube sweeping purposes. [4] No side flues but two boilers placed side by side. [5] Length includes only a 6-ft. stokehold and 6-in. space at boiler back. [6] Length includes 10-ft. stokehold instead of 9 ft., on account of overhanging smoke-box.

Cornish and Lancashire boilers are clearly indicated as most suitable for complying with the condition of intermittent working here in question, which is that prevailing in all public institutions, and in most industrial establishments,

If a watertube boiler were employed, a night attendant would be required to watch the fires and the water level, for, as stated by Mr. C. E. Strohmeyer, "with a slight access of air, combustion may suddenly be started, and the water in the boiler evaporated."*

Where the working load is continuous during day and night, but irregular, as in electric light stations, the watertube boiler certainly claims favourable consideration.

The rapid steaming qualities of the watertube boiler enable the engineer-in-charge to raise the pressure with a minimum delay by increasing the draught if the fire has been banked and kept in proper condition.

Still, a certain amount of warning is necessary, for if the fire happens to be low at the critical moment fresh coal must be added, and the first effect of this will be a reduction of pressure, and it will be equally difficult for the engineer to respond to a sudden call for power if the fire has only recently been banked.

Problems of this character rarely, if ever, come before the architect for solution, but they serve to suggest the conclusion that, unless skilled attendance can be provided, the watertube boiler is best left alone.

In establishments where the boiler is only required during the day, and where the day load is irregular, a boiler with a large storage reserve of heat is clearly advisable. Cessation of steam demands during the day can be met by banking the fires, and the absence of demand during the night in a similar manner.

So far as regards workhouses, a point to be remembered is that really competent stokers are not always provided, and, for this reason, simplicity of construction is a most desirable feature in boilers intended for such establishments.

(2) We now come to the second point affecting the choice of a boiler type—namely, the ratio of output to total capital expenditure. This is a matter upon which it is not difficult to arrive at a generally accurate opinion, in spite of the somewhat inconsistent results of many boiler tests. The anomalies evidenced by comparison of various trials conducted with boilers of similar type and dimensions, and worked on apparently identical conditions, are due to the influence of attendant circumstances which appear to have escaped notice. Recent investigation has shown that, within certain limits, the efficiency of a boiler and the output of steam depends more upon perfect combustion than upon the actual area and arrangement of the heating surface. Hence, an important point to be remembered is that a small boiler properly managed may be made to produce better results than a larger boiler improperly managed.

With the object of throwing light upon the relations existing between steam production and first cost in the case of various types of boilers in general use, we give in Table II. some of the results obtained by a series of experiments undertaken by Professor Kennedy and the late Mr. Bryan Donkin, in conjunction with Professor Unwin and Professor Déry, of Liège University. The investigations in question were conducted upon boilers under actual working conditions with coal of similar quality, and all the tests were made in accordance with a programme drawn up beforehand.

The usefulness of the results for purposes of comparison has been much increased by an investigation by Mr. A. Hanssen, A.M.Inst.C.E.,* into the actual cost of the various boiler installations on which the experiments were conducted. The cost of the boilers was ascertained as far as possible from the makers and owners, and, in cases

* Manchester Steam Users' Association. Mem. by Chief Engineer. 1902.

* Transactions of the Civil and Mechanical Engineers' Society, 1896.

TABLE II.—RATIO OF STEAM PRODUCTION TO COST OF BOILER INSTALLATION.

No.	Type of Boiler.	Dimensions.		Heating Surface.	Water Evaporated per hour.	Horse Power at 30 lb. of steam per h.p.	Estimated Cost of Installation.					Total Cost Horse Power = cost per h.p.	Authorities for Tests.
		Length.	Diameter.				Boiler and Fittings.	Brick Seating and Flues.	Chimney.	Boiler House.	Total.		
		ft. in.	ft. in.	sq. ft.	lb.		£	£	£	£	£	£	
1	Cornish	30 0	5 9	700	1,467	48·9	225	120	180	160	685	14·01	Professor Kennedy and Mr. Bryan Donkin.
2	Cornish	18 9	5 6	324	2,104	70·1	150	80	180	115	525	7·49	Professor Unwin.
3	Lancashire	21 0	7 0	582	1,277	42·6	300	160	180	139·5	779·5	18·30	Professor Kennedy and Mr. Bryan Donkin.
4					2,369	79 0						9 86	
5	Cornish	9 7	4 4	191·5	444	14 8	110	40	60	68	278	18·78	,,
6	Multitubular	19 0	7 0	804	3,920	130·7	435	75	80	162	752	5·75	,,
7	Locomotive	6 0	3 0	298	676	22 5	130	7	7·5	40	184 5	8·20	,,
8					335	11·2						16·47	
9	Locomotive	7 9	3 7	316	1,087	36 2	170	8	11·5	44·5	234	6·46	,,
10	Locomotive	7 7½	3 6¾	285	920	30·7	157·5	7·75	7·5	43·5	216·25	7·04	,,
11	Watertube (De Nayer)	14 9	2 7½	470·5	2,026	67·5	370	100	30	83	583	8·63	Professor Déry, Liège University.
12					1,9 7	64·9						9 12	

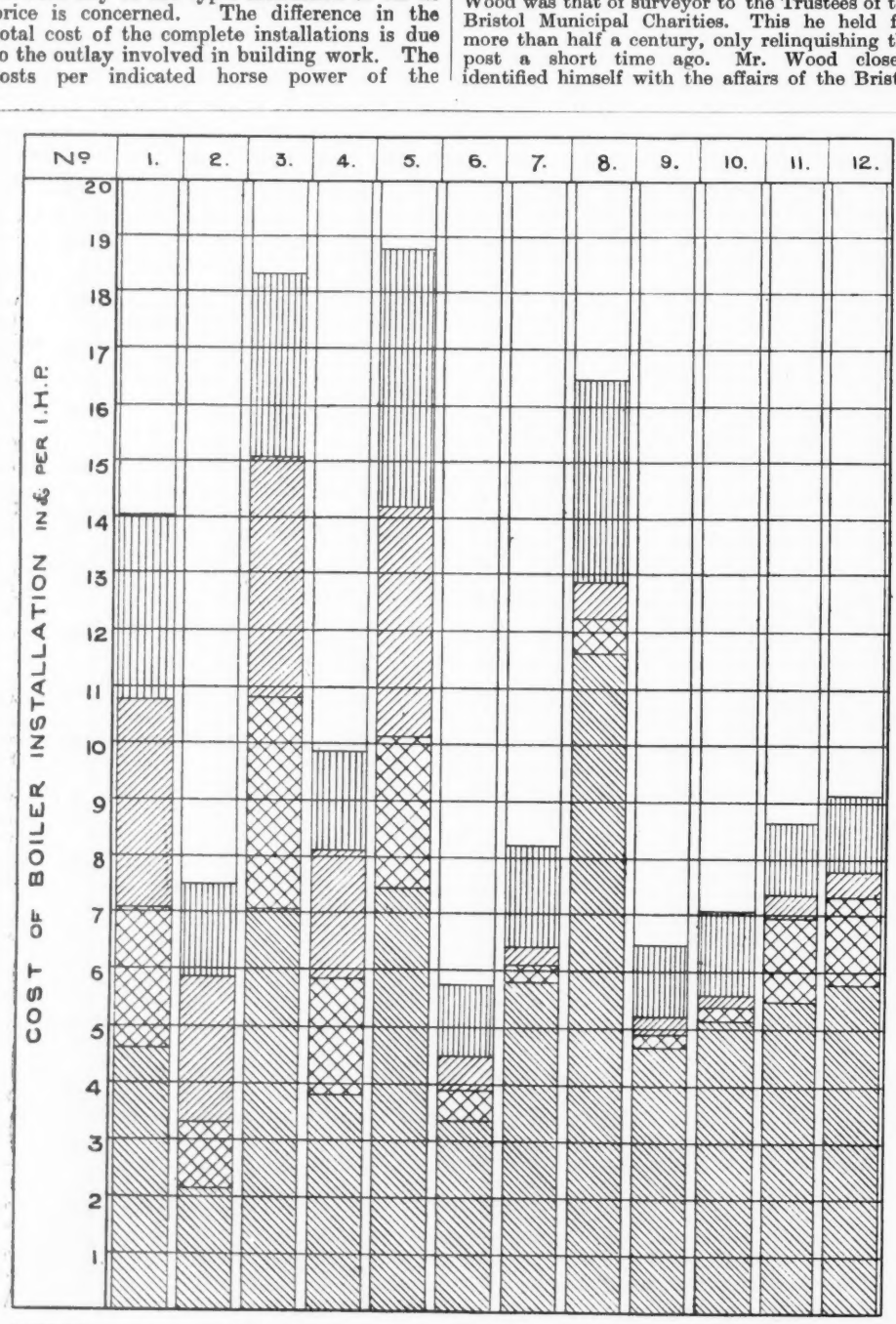
where this proved to be impracticable, the values were carefully estimated, the cost of the boiler seatings, flues, and chimneys having been ascertained in a similar manner. The boiler-house costs were determined by calculating the floor space required for each boiler, assuming the mean height of the building at 15 ft. from foundation to roof and taking the value of the building at 6d. per cubic ft. of space. The values in the columns of Table II. which refer to the cost of the various installations are taken from Mr. Hanssen's figures.

It will be noticed that the values of the ratio $\frac{\text{Total Cost}}{\text{Horse Power}}$ vary considerably, according to the working conditions adopted for boilers of the same type, and, in one or two cases, for the same boiler. These differences are very interesting, and should be carefully noted when comparison of the figures is made, especially as it is very often necessary to lay down a boiler plant with a view to increased output for future requirements.

If the cost of each boiler mentioned in Table II. be divided by the total heating surface, it will be found that the values do not differ very materially, the average, including delivery and fitting, being about 10s. per sq. ft.

As evaporative efficiency depends, other things being equal, upon the heating surface provided, there is not very much to choose between any of the types mentioned so far as price is concerned. The difference in the total cost of the complete installations is due to the outlay involved in building work. The costs per indicated horse power of the various installations mentioned in Table II. are given in diagrammatic form in Fig. 12 with the object of enabling the reader to make a ready comparison of the data.

We may add that the marine and other modifications of the multitubular type are very similar in principle to the multitubular Cornish boiler, for which results are given in Table II., and would show to equal advantage if tested under the same conditions.



— FIG. 12. —

Illustration to Student's Column.

OBITUARY.

MR. JOSEPH WOOD.—We have to record the death, on the 27th ult., of Mr. Joseph Wood, Fellow of the Royal Institute of British Architects, Past-President and Vice-President of the Bristol Society of Architects. Mr. Wood, who was born in the earlier quarter of the last century, entered into practice at the age of twenty-two years, and, as he never retired, he was for nearly sixty years actively employed as an architect and surveyor. Mr. Wood's loyalty to his partner always precluded him from claiming any particular building as his own design, and to the public they are only known as the work of Foster & Wood. The works of this firm include the principal portion of the important buildings erected in Bristol in the later half of the last century, and include premises now in the occupation of many well-known firms, besides many of the best ecclesiastical buildings in the same city. Mr. Wood, however, admitted that he had only once fully realised his ideal in this class of buildings—viz., in the simple little chapel of the Trinity Almshouses. The chief appointment held by Mr. Wood was that of surveyor to the Trustees of the Bristol Municipal Charities. This he held for more than half a century, only relinquishing the post a short time ago. Mr. Wood closely identified himself with the affairs of the Bristol Society of Architects from its earliest years, and, during the later part of his life, was annually re-elected Vice-President, and served his two years' term as President, yielding place to the present occupant of the position, Mr. Oatley. A few years ago he was selected by the Royal Institute as one of those who, from the nature of their accomplished work, were worthy to be elected to the Fellowship without examination. One of Mr. Wood's old pupils writes:—"To a younger man a walk through Bristol with Mr. Wood was a liberal education. He seemed to know every piece of ornament worth noting, and the spots from which they could best be sketched. His knowledge of the history of the city was a cause of wonderment. He would point to windows which had been closed on account of the light tax, and show water-marks caused by the overflowing of the gutters in the days before underground drainage was dreamed of or adopted. Occasionally he would forget that his companion was not of his age, as when he asked the writer if he remembered the old Houses of Parliament before they were burned, or alluded to the creation of some edifice now regarded as historic."

MR. HOWELL.—Mr. Charles Henry Howell died on June 22, aged eighty-one years, at Lynwood, Leatherhead. He was elected an Associate in 1848, and in 1861, a Fellow of the Royal Institute of British Architects. Mr. Howell, until his retirement from practice about ten years ago, had been surveyor of public buildings for the county of Surrey; he was formerly architect to the Lunacy Commissioners, and surveyor to the Norwich Union Insurance Company. He made the plans and designs for the County Hall, after the Renaissance style (1892-3), at Kingston-on-Thames, and was employed in the erection of several asylums and similar buildings.

MR. BUCKLER.—The death, in his eighty-first year, is announced of Mr. Charles Alban Buckler, a member of the Order of Malta, and architect, we understand, of the Dominican Church, near Haverstock Hill, Hampstead. Mr. Buckler was a learned ecclesiologist, and was well versed in the history and literature of architecture.

GENERAL BUILDING NEWS.

CHURCH, TROEDYRHIW.—The new Church of St. David's, situated in Merthyr-road, Troedyrhiw, has just been completed. The church, which will accommodate 250 worshippers, is intended for the holding of Welsh services, and adjoining it is a hall designed for church meetings and for general public purposes, with accommodation for about 750 persons. Messrs. Evans & Green were the architects, and the contract has been carried out by Messrs. Jones Brothers, of Quakers' Yard.

BAPTIST CHURCH, EASTLEIGH.—The foundation-stones were laid recently of the new church which is being erected on the site adjoining the present one in Desborough-road. The new building, costing 3,200*l*., and seating 750 people, is constructed of red brick, with Bath stone facings. Inside, a gallery and organ loft, with accommodation for the choir, will be provided, whilst near the restrum will be situated the Baptistry. The heating will be on the high-pressure hot-water system, and the lighting by incandescent burners. The floor will be of wood blocks, and the seats of pitch pine. The builders are Messrs. Golding & Ansell, Southampton, and the architect Mr. J. Wills, Derby.

WESLEYAN CHURCH AND SCHOOLS, SALTBURN.—These buildings have just been completed at a cost of over 7,000*l*. The church is divided into nave, aisles, chancel, and organ chamber, with pillars and arches in Whitby stone. Internally, the whole of the woodwork is in pitch-pine, and there is sitting accommodation for 650 people. The old chapel has been converted into Sunday school premises by gutting the old gallery, and provision has also been made for a large guild room, ladies' parlour, and classrooms. The schoolroom will accommodate 350 scholars. The contractors for the whole work have been Messrs. T. Dickinson & Son, of Saltburn and West Hartlepool, while the architects were Messrs. Garside & Pennington, of Castleford and Pontefract.

CHAPEL, CHESTER-LE-STREET.—On the 21st ult. the foundation-stones of a new P.M. Chapel were laid at Chester-le-Street. The new chapel is being erected by the members of the Chester-le-Street P.M. Red Rose Mission. The site of the new building is in Clifford-terrace. When completed the chapel will provide seating accommodation for between 400 and 500. It will comprise a nave, three vestries, gallery, and organ gallery. The main entrance will be situated in Clifford-terrace, while the entrance to the gallery will be in the tower. The building will be in the Gothic style, and the design will be executed in red brick with stone facings. Subsequently it is intended to extend the building by the erection of a Sunday school, which will contain six classrooms. It is expected that the chapel will be completed within nine months, and will cost about 2,200*l*. The building is being erected by Mr. C. Groves, of Chester-le-Street, from plans prepared by Messrs. Boyd & Groves, architects, Newcastle.

SCHOOL, HOVE.—A new school is to be built in Portland-road, Hove, at a cost of 6,550*l*. Provision will be made for 600 scholars, and the school will have a frontage of 124 ft. to Portland-road. There are to be eleven classrooms and a central hall, all on one floor, with the usual teachers' rooms, cloak lobbies, lavatories, passages, etc. For heating purposes Teale's open fireplaces will be installed in the different departments, but the central hall and the cloak lobbies are to be warmed by Grundy's hot-air system. The building will be of brick with green slated roofs. The internal walls will be plastered above salt glazed brick dadoes, and the woodwork lightly stained and varnished. For the new school the architects are Messrs. Clayton & Black, of Brighton, and the building contract has been entrusted to Messrs. Norman & Burt, of Burgess Hill.

LEYS SCHOOL, CAMBRIDGE.—A few days ago the Duchess of Albany laid the foundation-stone of the Moulton Memorial Chapel and opened the new swimming bath at Leys School, Cambridge. The chapel, which forms a memorial to the late headmaster, Dr. Moulton, is being erected by Mr. W. Saint, contractor, after plans and designs by Mr. Robert Curwen.

SCHOOL PREMISES, PRESTON.—The cutting of the first sod on the site for a new school to be erected in Christ Church Parish, Preston, took place on the 19th ult. The school, which, together with the site is expected to cost upwards of 3,000*l*., will be in Gothic style, constructed of Accrington brick, with stone dressings, and roofed with Velinhelli slates. The main entrance is by a porch on the north side which leads into a corridor 10 ft. wide. On the right of the corridor is the cloakroom, with lavatories, and on the left a classroom 24 ft. by 18 ft., with accommodation for forty-eight children. From the corridor as well as from the class and cloak rooms access can be gained to a central hall 25 ft. square, and lighted by a lantern light. Flanking this hall in the east and west sides are classrooms, and on the south side another corridor leads from the hall into a yard. On the right of this corridor is a babies' room for fifty-four children, and on the left another classroom for forty-eight children, and beneath the corridor is the heating-chamber and storage for fuel. The floors of the rooms will be laid with coke-breeze on concrete, and the roofs are open timbered. The central hall is divided from the classrooms by sliding screens so arranged as to provide a room 58 ft. by 25 ft. The height of all the apartments from floor to the square is 14 ft. Messrs. Myres, Veevers, & Myres, of Preston, are the architects, and the contract has been let to Mr. R. N. Hull, also of Preston. The total accommodation of the school will be 250.

PRIMITIVE METHODIST BUILDINGS, WALKLEY, SHEFFIELD.—The new Sunday schools and Young People's Institute, adjoining the Primitive Methodist Chapel at Walkley, were opened recently. The new buildings have a frontage to Greenhow-street, at the rear of the present chapel in South-road. The school is on the ground floor, and consists of an assembly-room, 58 ft. 6 in. by 34 ft., around which are grouped five small classrooms, separated from the assembly-room by movable glazed screens. Accommodation is provided for a total of 500 children. The institute, also on the ground floor, measures 32 ft. 6 in. by 22 ft. 6 in., and accommodates 140 adults. Infants' room, kitchen, and other accessories are situated on the basement floor. The building is of Crookes stone. It is lit with electricity, and heated on the low-pressure system. The architect was the late Mr. W. J. Taylor, and the work has been carried out by Messrs. John Vasey & Sons. The contract price was 3,000*l*.

COUNCIL OFFICES, WOODFORD, N.E.—New offices are to be erected by the Woodford District Council at the junction of Monksham's-avenue and King's-avenue. The building is in the Georgian style, and will be built of red brick and stone, the roof being covered with green slates. It is proposed to light the building by means of gas. The site belonging to the council on the opposite side of King's-avenue will be utilised for the provision of a fire-station, cart-sheds, and stores, etc., in connexion with the surveyor's department. The principal building will be the fire-station, which will afford accommodation for a resident fireman, storekeeper, call office, mess-room for men, engine-house, with hose tower adjoining, and practice platform. At the further end and sides of the site will be placed the stores, cart-sheds, mortuary, and ambulance-shed. The architect of the new buildings is Mr. Arthur C. Blomfield, and the cost will be over 19,000*l*.

FEVER HOSPITAL, PETERHEAD, N.B.—On the 17th ult., the foundation-stone of the new infectious diseases hospital for the burgh of Peterhead was laid. The building, which is situated on the north side ef the town, is being built after plans by Mr. T. H. Scott, the Burgh Surveyor. It is of the villa type, built in four blocks, and will contain sixteen beds. Mr. William Stuart is the contractor, and the cost is estimated at about 4,000*l*.

LIBRARY, CROSBY.—The new public library, which has been erected at a cost of 5,600*l*., was opened at Crosby on the 23rd ult. The library has been erected on a triangular piece of land belonging to the District Council, with a frontage to College-road. It is near to the Alexandra-hall, being separated from that building by the newly-constructed road called Coronation-road. The plans were prepared by Messrs. Anderson & Crawford, architects, of Liverpool, and the new building is arranged as follows:—Opposite the porch is the entrance to the lending library, and to the right and left of same access is provided to the boys' room and newspaper and magazine reading-rooms respectively; whilst in the rear of the latter is placed the reference library. The librarian's room is situate between the boys' and ladies' rooms, and is within easy reach of the public counter in the lending library. The building is divided into three parts by two lines of arches on either side of the lending library, which is the central room, and these are filled in with bookcases and counters for direct service to the different rooms. Behind the ladies' room, which has a separate entrance on the south side, is lavatory accommodation for the staff. Adjoining the same is a staircase leading to the heating and coal-cellars in the basement, and to the book-repairing room on the first floor. An entrance for the staff is provided at the rear of the building, whilst over the vestibule is placed a book store, access to which is attained by a spiral staircase from the lending library. The ground floor of the building is laid with wood blocks, and the walls are covered with a tiled dado about 5 ft. high. Externally, the library is faced with red pressed bricks, relieved with Stancliffe stone dressings; and the semi-circular entrance porch is supported by two granite columns. A small clock tower is a feature of the front of the building, the roofs of which are covered with Westmorland green slates.

PUBLIC LIBRARY, LOUGHBOROUGH. — A new public library has just been opened at Loughborough. The building consists of a reading-room, 40 ft. square; lending library, 28 ft. by 36 ft., with accommodation for 10,000 volumes; and reference library, 25 ft. by 19 ft. Behind these are the librarian's office, stores, staff room, caretaker's room, lavatories, etc., the librarian's residence, which adjoins, having a frontage to Packe-street. Externally the building is faced with sand-stock bricks, with terra-cotta dressings, and is in the Renaissance style. The lighting and heating are by electricity and the hot-water low-pressure system respectively. The contractors have been Messrs. W. Moss & Sons, Loughborough, and the architects Messrs. Barrowcliff & Allcock, Loughborough (their design being accepted in open competition with representative Nottingham, Leicester, and Derby firms).

FOOTBALL PAVILION, PITTODRIE, ABERDEEN.—The directors of the Aberdeen Football Club have decided to erect a new pavilion at Pittodrie. The plans for the building have been prepared by Messrs. Cameron & Watt, architects. It will be a two-story building, constructed of wood and iron, with stone foundations running along in front. The frontage will be 45 ft., and the pavilion will be 21 ft. in height.

WEST CORNWALL HOSPITAL, PENZANCE.—The new West Cornwall Dispensary and Infirmary at Penzance is nearing completion. Mr. Oliver Caldwell is the architect of the new hospital, and Messrs. Perkins, Caldwell, & Caldwell, of Penzance, are the contractors, the amount of their contract being 7,400*l*. The new hospital comprises a central administrative block of two stories, with a ward block on each side, and various rooms attached. From the south wing of the building the new public dispensary will be built. The central, or administrative, block comprises on the ground floor a vestibule, entered from St. Clare-street, and the main corridor, which runs the whole length of the hospital, and branching from which on the west are the nurses' dining-room, the matron's room, the medical officer's room, the operating theatre, and the storeroom, etc. The main staircase to the first floor branches off from the main corridor, and is being made of extra width to permit of the erection of an additional story in the future, if necessary. Throughout provision has been made for any prospective extension of the hospital by the erection of another story. On the other side of the corridor of the main block are the kitchens, scullery, pantry, larder, and the board-room. Going north in the main corridor are the secretary's and porter's rooms, the main ward, to contain twelve beds, two private wards, ward kitchen, and sanitary towers. Additional sanitary arrangements are provided for the private wards. The main ward is 50 ft. long and 25 ft. 6 in. wide. The ward is lighted by fourteen windows, which run to the ceiling level, is ventilated on the Boyle system, and is heated by one of Shorland's double-fronted stoves with under flues. At the south-west end of the ward is an airing verandah for convalescent patients. The private wards are similarly heated and ventilated. The ward kitchen is situated centrally between the main and private wards. The south ward will be the same as the north ward. The operating theatre is 24 ft. long and 15 ft. wide. It will have a terrazza-tiled mosaic floor, and the walls will be lined with white glazed tiles. A feature of the scheme is that all the administration will be performed on one floor. In case of accident, the ambulance will be wheeled right into the hospital and the patient treated without being moved up or down steps. The corridors throughout will be laid with wood blocks, and the floors of the kitchens, scullery, and other offices tiled. On the first floor of the administrative block are the bedrooms for the staff, the matron's room, linen and store room, and baths and other sanitary arrangements. The dispensary block comprises a public hall, 32 ft. by 27 ft., room-physicians' room, physicians' examining room, surgeons' room, surgeons' examining room, visitors' room, dental room, dispensing room, and separate sanitary arrangements for male and female out-patients. The laundry, built in the south-west corner of the ground and detached from the hospital, includes a washhouse, ironing-room, and drying-room. The walls are of stone, with red brick dressings, granite sills, and plinth.

WEAVERS' INSTITUTE, NELSON.—The Weavers' Institute in Pendle-street, Nelson, has been erected on a site at the junction of Pendle and Cross streets, the principal entrance being from Pendle-street. There is also a side entrance from Cross-street. The basement contains store-rooms, heating cellar, etc. The ground floor contains general and secretaries' offices, committee-room, and a large lecture-room capable of seating 150 persons. The first floor contains reading, conversation, committee, and debating rooms, refreshment-room, and a billiard-room, the size of the lecture-room below. On the second floor is an assembly-room, capable of seating 600 persons, with raised platform and two ante-rooms. The floor is specially prepared for parties, and a hoist connects this room with the basement. The lighting is electric throughout, supplemented by gas for emergency purposes. The work has been designed by and carried out under the personal supervision of Mr. Thos. Bell, architect, Burnley and Nelson, at a cost of over 4,000*l*.

APPOINTMENT.

PANAMA CANAL COMMISSION.—Mr. John F. Stevens, who, as expert on behalf of the Government, superintended the construction of railways in the Philippines, and was formerly Vice-President of the Chicago, Rock Island, and Pacific Railway, has been appointed chief engineer of the Panama Canal Commission, at a salary of 6,000*l*. per annum, *vice* Mr. John F. Wallace, resigned.

FOREIGN.

FRANCE.—The "envois" of the students of the Villa Medici are shortly to be exhibited, as usual, at the Ecole des Beaux-Arts. In architecture M. Jaussely (1st year) sends the Trajan column and fragments of the Ara Pacis Augustæ; M. Prot (2nd year) fragments of the mosque at Karaman (Asia Minor) and the tombs of Innocent VIII. and Sixtus IV. at the Vatican; M. Hulot (3rd year) sends drawings of the ruins at Selinonte as now existing; and M. Bigot (4th year) a restoration of the Colosseum.——M. Ziem, the painter who has made scenes in Venice and the East his special study, has presented to the city of Paris forty paintings and as many water-colours. They will be arranged, after the 14th inst., in a room in the Petit Palais to be called after the name of the painter.——M. Gilbert has been appointed architect of the hospital at Vésinet, in place of the late M. Boudin.——A Parliamentary Committee is to be appointed to consider the condition of the provincial museums, and the means of making the best use of collections some of which are little known.——The buildings of the Grand Chartreux, now abandoned, have been classed as Monuments Historiques, and their preservation therefore is ensured as a State charge.——The Municipality of Reims are about to devote a sum of 1,500,000 francs to various architectural works, more especially the completion of the Institut Laënnec, and the continuation of the works at the hospital of Pontchailou.——There is talk of forming a great bathing establishment at Dieppe, with a casino on the site of the present Hôtel de Ville, which, with the museum, is to be rebuilt at another part of the town.——The Municipality of Paris has voted a sum of 884,000 francs for various new scholastic buildings.——M. Amersheim, the architect, has just completed the restoration of the church of St. Urbain, at Troyes, which dates from the XIIIth and XIVth centuries.——M. Girault, the architect of the Petit Palais, has been commissioned to erect at Brussels a large building for the Belgian Colonial Institute, the first stone of which has been laid by the King of the Belgians.——MM. Le Cœur and R. Bouvreuil have obtained the first premium in the competition for a block of school buildings at Dieppe.——Mr. James Stillman, President of the National City Bank of New York, has presented to the Ecole des Beaux-Arts a sum of half a million francs, to be applied (under certain

conditions, not yet finally fixed) in prizes for a certain number of pupils of French nationality.

FURTHER NOTES ON THE CEMENT TRADE ABROAD.—According to the report of the British Consul at Cadiz for 1904, the output of the local cement works for the year was 5,672 tons, which was all sold in the country at 60 pesetas (*l.* 16*s.* 4*d.*) per ton. The price of British cement in Cadiz is about 83 pesetas (2*l.* 11*s.* 6*d.*) per ton. Only 956 tons of cement were imported during the year—600 tons from France, 150 from Germany, 35 from the United Kingdom, and 171 from Belgium.——Mr. Consul Wardrop, reporting on the trade of St. Petersburg, writes:—"At the beginning of 1904 there were thirty-eight Portland cement works, with a maximum productive power of 7,970,000 kegs per annum; there were also eighteen Roman cement works. No trustworthy figures of recent actual production can be obtained."——In Norway, according to the report of Viscount Melville, H.M. Consul-General, cement has very strong competition—especially German—to fight against, which has forced prices below the normal, and German factories are said to have disposed of their production in Norway for less than the cost of production in Norway itself. The duty was raised on April 1, 1904, but complaint is made that it is insufficient to protect the Norwegian industry. The native consumption of cement has decreased since 1899. The export of Norwegian cement in 1903 amounted to about 68 tons, while about 18,000 tons of foreign cement entered Norway, nearly 12,000 tons of which came from Germany, 5,000 tons from Denmark, and 233 tons from the United Kingdom. The principal Norwegian cement works, the machinery of which is driven by electric power from the Glommen River, are at Slemmestad, in the Christiania Fjord.——The trade in cement in Portland, Oregon, U.S.A., in 1904 was large, and nearly all the imports were either from Germany or Belgium. Best brands sold at 8*s.* 9*d.* to 9*s.* 2*d.* per cask. There was some competition with California cement, packed in bags, which is sold at 1*s.* to 1*s.* 6*d.* less. It is not generally considered equal to imported cement, but is likely to prove an important factor in the trade. Heavy stocks are held at ports in Oregon, but consumption has increased largely. During the past year at Astoria cement was used for pavements and macadam for the roadways, adding very much to the neatness of the town. The cement used was of California production, very little of European manufacture being employed. ——At Seattle (writes Mr. Vice-Consul Pelly) the average price hitherto obtained for imported cement of standard brands has been from 9*s.* 7*d.* to 10*s.* per barrel. The price is now somewhat lower. German and Belgian makes are mostly used. Japanese cement is only used to a very limited extent. California cement, of the "Golden Gate" and "Standard" brands, is rapidly becoming better known, and is now accepted on all municipal works. It is packed in bags, and sells from 1*s.* to 1*s.* 6*d.* less than imported cement. A British Columbia manufactory has recently put a cement on the market, but has not yet entered this field (Seattle). The rate of freight from British Columbia will probably not exceed from 5*d.* to 7½*d.* per barrel. The rate of freight of California cement is 1*s.* per barrel. In shipping the exact weight should be given in the bill of lading, otherwise the Customs reckon 400 lb. to the cask. The duty is 8 cents per 100 lb.——The trade in cement in Puget Sound is considerable, the average yearly value of the imports for the four years prior to 1903 having been 43,525*l.*; in 1903, 198,190 casks were imported, valued at 55,560*l.*, and in 1904, 254,972 casks, valued at 71,437*l.*——The imports of cement to Oporto from the United Kingdom during the past four years has been—in 1901, 358,335 kilos, value 5,343$000 reis; in 1902, 78,510 kilos, value 783$000 reis; in 1903, nil; in 1904, 649,096 kilos, value 5,062$000 reis. —Mr. Faber, British Consul at Fiume, writes under date May 20:—"The cement trade is supplied by the home works, and there is even a considerable export trade *viâ* Trieste. This market was supplied in 1904 with 2,250 tons from Hungary and 865 tons from Austria. The submarine masonry blocks used in the harbour works are made with a natural cement brought from the island of Santorin, in Greece, as this is found to harden when immersed.

PRESERVATION OF ANCIENT MONUMENTS IN INDIA.—It is officially reported that during the year 1903-4 the Archæological Surveyor of Western India toured in Central India, the Central Provinces and Rajputana. The expenditure on the conservation of ancient monuments in the Bombay Presidency amounted to 2,200*l.*; that in the Central Provinces and Berar to 700*l.* The amalgamation of the archæological circles of the United Provinces and Punjab was effected in July, 1903. There are still, however, two officers, one of whom, known as the superintendent, has his headquarters at Lahore, and is concerned solely with the architectural side of Muhammadan archæology. The other officer, known as the surveyor, has the supervision of the buildings at Agra, Jaunpur, Delhi, Lahore, and Ajmere, and deals with matters affecting Hindu and Buddhist buildings. The former was engaged at first in excavations at Charsada, in the Frontier Province, and subsequently visited Chamba and the ancient temples of Kashmir, and places in the United Provinces. The North-West Frontier Province and Balchusitan have been placed, as regards archæological work, under the separate charge of Dr. M. A. Stein. The amount of 12,400*l.* was spent in the United Provinces and Punjab circle from Government revenues on conservation of monuments. In Madras, excavation of prehistoric remains at Adinachallur, and other places in the Tinnevelly district, resulted in the unearthing of a very large number of objects of great interest. In Bengal the chief work of the year was the excavation of the ancient site of Vaisali, at Basarh, and the adjacent villages in the Muzzaffarpur district; 4,150*l.* was spent on conservation in Bengal. In Burma the amount of such expenditure was 5,100*l.* Much progress was made in improvements to the Mandalay palace and its surroundings. An Act passed by the Council of the Governor-General in 1904 to provide for a preservation of ancient monuments and of objects of archæological, historical, or artistic interest, was designed to secure the preservation to India of its ancient monuments, with particular reference to those in the hands of private owners, to control the traffic in antiquities by reserving power to prevent the removal from British India of any antiquities it may be deemed desirable to retain, and to prevent the excavation by ignorant or unauthorised persons of sites of historic interest and value.

SOUTH AFRICA.—At the ordinary general meeting of the Master Builders' Association (Johannesburg), Mr. C. Woods presiding, Messrs. Seago & Gabriel, who were the delegates representing the Association at the recently-held conference in connexion with the building trades at Port Elizabeth, gave an account of the business transacted at that meeting.——Work on the new City Hall in Capetown is nearing completion, and it is expected that the work will be finished early in July.——The Town Engineer of Germistown (Transvaal) is engaged in drawing up a scheme for municipal buildings, which will include a town hall and the necessary offices for the Council's work.——Among the improvements about to be carried out in Cradock is the construction of a large block of shops and offices for Mr. S. G. Webbe. The architect is Mr. Jones, of Port Elizabeth, who designed the local new Victoria Hotel.

QUEEN VICTORIA STATUE, NASSAU, BAHAMAS.—On Empire Day, May 24, Sir William Grey-Wilson, the Governor, unveiled a statue of Queen Victoria at Nassau, which has been erected by citizens of the colony. The statue, sculptured by Mr. J. Adams Acton in Carrara marble, and mounted upon a pedestal, 8 ft. high, of Peterhead granite, is of heroic size, and represents Queen Victoria seated upon a throne, wearing her robes of state and holding the sceptre and orb.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—The permanent offices of the "Quantity Surveyors' Association" (Incorporated) are now fixed at 17, Bedford-row, W.C. Mr. F. B. Hollis is the secretary.——Mr. Morgan Williams, consulting engineer, of 39, Victoria-street, Westminster, has taken into partnership Mr. Harold W. Couzens, M.Inst.C.E., and the business of the firm will henceforward be carried out under the title of Morgan Williams & Couzens.——Messrs. J. Hodson & Son (Nottingham) are the appointed agents for the "Hopton Wood Stone Firms, Ltd.," an amalgamation of the Hopton Wood Stone Company with the firm of Messrs. Killer Brothers, as announced in a previous issue.

A NEW COMPUTING SCALE.—For finding the areas of irregular figures, surveyors and engineers have been obliged hitherto to rely upon direct computations by Simpson's rule or some analogous method, upon the computing scale, or upon the planimeter. In the "Radial Area-Scale," patented by Mr. R. W. K. Edwards, we have an extremely simple and ingenious instrument which is equally available for computing the area of a regular or irregular figure. We have received an example of this scale, consisting of a celluloid sheet, 8 in. by 6 in., on which eleven diverging lines are engraved radiating from a centre 1·75 in. outside the sheet, each line being graduated with fractional dimensions. The two outer lines—those at the top and bottom, respectively—are separated by an angular distance of 28 deg., and the eleven lines are equally spaced so that the distance between any two adjacent lines is 2·8 deg. The lineal distances between the lines are nearly 0·1 in. at the left-hand of the scale, and nearly 0·5 in. at the right-hand side. Roughly speaking, this particular example is not available for computing the area of a figure of which the greatest length and breadth are more than 7·5 in. and 4·5 in., respectively. But larger areas can be measured by dividing them into two or more parts. Larger sizes of the instrument are made in celluloid or plate-glass to meet the requirements of those having to deal with figures of greater area than can be measured by the small-sized scale. The use of the radial area-scale is very simple, and, with the object of testing this characteristic, we placed it, together with the printed directions, in the hands of a junior member of our staff with instructions to find the area of two figures, one being a square and the other a circle. In each case the correct result was found without the least difficulty or delay. The manner in which the scale is used may be thus briefly outlined:—Place the scale, with the lines radiating from left to right, over the figure to be measured, so that the two outside lines touch the upper and lower boundaries. Then read off the values graduated on each of the nine intermediate lines at the points where these lines are intersected by the right-hand part of the boundary of the figure. Next read off the values in like manner for the left-hand boundary of the figure. Add the first nine readings and the second nine readings; subtract the second sum from the first sum; and the result is the required area in square inches. One or two other directions are given for guidance in particular applications of the instrument, but they are of equally simple character. This area-scale is made by Messrs. Morgan & Kidd, of Richmond, and we feel quite sure it will be found a most useful aid to architects, surveyors, and engineers.

FIRE-RESISTING PARTITIONS.—Two of the "Red Books" issued by the British Fire Prevention Committee (namely, Nos. 92 and 93) describe the results of fire-tests of the "Mantada" partitions (2½ in. and 2⅛ in. in thickness) fixed by the Adamant Company (Birmingham). Red Book No. 93 records the earlier test made on January 18, 1905, with partition slabs 2 in. thick, plastered on the side exposed to the fire, so that the total thickness was 2⅛ in. Each whole slab measured 24 in. horizontally and 12 in. vertically, and was perforated vertically with seven holes 1 in. in diameter, and each end had a semi-circular groove. The horizontal joints were square. The slabs were laid to break joint, and were keyed together by means of wood slips ½ in. by ½ in. placed in all the end joints, and continued through the central holes of the alternate courses; in other words, the wood slips were placed in every fourth hole, and were 12 in. from centre to centre. Finally, all the holes were grouted solid with plaster. The test was very severe, the internal temperature of the test-kiln at one point ranging from 1,300° to 1,940° Fahr., and being maintained for two hours and a half. Immediately after the gas was turned off, water was turned on to the inside face of the partition, through a ¾-in. jet. "The partition was weakened during the fire-test by the carbonising of the wood slips which should have held it together," and although it stood well through the fire-test itself, about 20 ft. super. of the partition fell two minutes after the water had begun to play on it. In the later test (Red Book No. 92) the same method of construction was adopted, but the slabs were 2⅛ in. thick (finishing 2½ in. when plastered on one side), and iron tubes, ½ in. in internal diameter, were used instead of wood slips to key the slabs together. The official note states that "although the fire and water passed through the partition, it retained its position; . . . the result indicates that the quantity of metal was excessive."

SWEDISH WOOD EXPORTS.—In his report for 1904 on the trade and commerce of Stockholm and the Eastern coast of Sweden, Mr. Macgregor, British Consul, observes that, on account of the unfavourable state of the wood market in the United Kingdom and South Africa, and also because of the lack of co-operation among the Swedish exporters, a continuous fall in prices took place, which for red wood deals may be put at about 4*l.*, and for other kinds of wood at about 1*l.* and 2*l.*, with the exception of planchettes and slatings, for which the fall amounted scarcely to 10*s.*, all per standard. As the circulars sent out seemed to indicate that the stocks in the ports of export were relatively small, and those in the ports of import very scanty, both sellers and buyers were hopeful at the beginning of 1905. Germany bought up large quantities of white wood battens and red and white deals at prices which were at least 10*s.* better than those of last autumn. British orders also increased, and altogether a fair start was made, except for red wood deals, for which the demand continued insignificant. It is hoped, however, that South Africa will soon absorb the surplus stocks imported there during the last two years, and again become a good customer for deals of red wood, the prices for which have been ruinously low. According to the report of the Swedish Sawmill and Wood Exporters' Association, the export of deals, battens, and boards, planed and unplaned, from the whole of Sweden was in the year 1900, 1,009,448 standards; in 1901, 903,787 standards; in 1902, 1,004,606 standards; in 1903, 1,039,462 standards; and in 1904, 915,390 standards. In 1904 there was a decrease in the total export of

wood from Sweden of about 124,000 standards, as compared with the previous year. Of this amount there were over 86,000 standards less to the United Kingdom, while the export to Germany shows an increase of 10,000 standards, and to France (Algiers and Tunis included) 14,000 standards. The quantities sent to Australia, Portugal, and Egypt also show improvement, but to Belgium and Spain they have considerably diminished. The amount sent to South Africa (including Cape Colony) was about 59,000 standards less than during 1903. This was the largest decrease comparatively to any country during 1904, and, being chiefly red deals, is considered the most serious one.

CITY AND GUILDS OF LONDON INSTITUTE.—In the annual report of the Council of the City and Guilds of London Institute it is noted that Mr. Colton is the fourth sculptor student of the Institute who has been singled out for election as an Associate of the Royal Academy. The report continues: "He was a student at both the South London School and in the Art Department at Finsbury, and exhibited some of his early work at the exhibition of students' work collected by the Institute at Skinners' Hall in 1893. The Council may claim that by establishing their School of Art in South London, and allowing it freedom to develop its own methods of training, they have contributed very materially to the advancement of English sculpture to the eminent position it has now attained both at home and abroad. Mr. Sparkes estimates that at least two hundred capable men trained and educated in this school are at the present moment doing the best work in the country in architectural sculpture in marble, bronze, silver, ivory, and other materials."

THE LABOUR MARKET IN THE COLONIES.—The July circulars of the Emigrants' Information Office state that in *Canada*, though the demand for more mechanics is not so great as for farm labourers, there has been good employment for skilled men in the building and manufacturing trades. In the six States which compose the *Commonwealth of Australia* there is not much demand for more labour, and none of these States give any money assistance towards emigrants' passages except Queensland and Western Australia. An emigrant must be careful not to enter beforehand into any agreement to perform manual labour in the Commonwealth, as in that case he will not be allowed to land. There is as a rule a sufficient supply of mechanics, and men of this class are not recommended to go to Australia unless they are specially skilled in their trades, or have friends to go to, or unless they can afford to wait a little till they find suitable employment. In *New Zealand*, though there is no special demand for more men, a competent mechanic should be able to find employment without much delay. No one may enter *Cape Colony* unless he possesses 20*l.* on arrival, or has secured work beforehand. The building trade at Cape Town shows no sign of improvement, and at Port Elizabeth there is a good deal of distress owing to the depression. No one may enter the *Transvaal* without a permit, which should be applied for at least a week before sailing. Though the output of gold is very large, and more white men are being employed about the mines than was the case last year, the supply of labour in all trades at Johannesburg is still considerably in excess of the demand. Many mechanics are out of employment, and others have left the country. In Pretoria, and in country districts also, the supply of white labour is ample. Men are therefore warned against going to the Transvaal at the present time unless they have secured work beforehand or have sufficient means to keep themselves for some months. No one may enter the *Orange River Colony* without a permit. There is no improvement in the demand for labour, and persons are warned against going to the Colony at the present time in search of work. Country districts also are suffering as well as the towns.

PROPERTY SALES.—The "old vicarage house" at Shiplake-on-Thames has been sold for, it is said, 6,000*l.*; it was the residence in the XVIIIth century of James Granger, who there completed his "Biographical History," and gathered his collection of portrait-prints, and there was celebrated the wedding of the late Lord Tennyson.——Consequently upon the death of Mr. John Warren his estate of Handcross Park, Cuckfield, Sussex, covering about 400 acres in all, will shortly be offered for sale at auction; the house was built by Messrs. William Lawrence & Sons, after the late Thomas Chatfield Clarke's plans and designs.—Amongst other properties now placed on the market are "Laggis," in Netherhall-gardens, Hampstead, which was built twenty years ago by Messrs. Kelly from Mr. George Sherrin's designs, the fittings and decorations—mostly after the Italian and Early French Renaissance styles—being carried out by Messrs. Gillow.——The manor-house, Mancetter, Warwickshire, which contains some fine old woodwork, and was the home of Robert Glover, the Protestant martyr, who was burned in 1555, and of which the descent is traced from Walkeline de Mancetter, who derived the manor from Hugh Lupus, Earl of Chester, *temp.* William I.——Bearhill estate, of about 510 acres, near Hersham and Weybridge, and including a park, 200 acres, which once formed a demesne of Hampton Court.——Orton estate, near Peterborough, extending over 5,000 acres, with Orton, in Overton Longueville parish, Hunts.—a seat of the Marquis of Huntly, and yielding an aggregate rental of 6,140*l.* per annum.——Temple House, the adjacent paper mills, Hurley House, and other properties, near Marlow, owned by the late General Owen Williams, and comprising some 700 acres. Temple House, in Bisham parish, which stands on the backwater near Temple lock and the mills, was built on the site of a preceptory of the Knights Templar; some of the principal rooms were decorated by Adam.——The Earl of Cork's estates of about 3,500 acres in and near Frome, with Marston House, have realised an aggregate of 120,000*l.* at auction, valuations of timber, etc., excluded; and Mr. George Coats, of Paisley, has purchased from Mr. Ean Cecil, for 155,000*l.*, at the Mart, the Glen Tana estate of 29,200 acres in Aboyne and around, consisting mainly of deer forest and grouse moor, with eleven miles of salmon fishing in the Dee.

A "GOODBYE" TO SIR CASPAR PURDON CLARKE.—On June 28 Sir John Gorst, M.P., presided at a farewell banquet given in the Criterion restaurant to Sir Caspar Purdon Clarke, who will shortly take up his new post as director of the New York Metropolitan Museum in succession to General di Cesnola. More than forty years ago Sir Caspar entered the National Art Training Schools at South Kensington, where he won the National Medal for architectural design. In 1870 he went to Italy as superintendent of mosaic reproduction in Rome and Venice, and in 1872 he completed the decorative work at the Church of St. Mark, Alexandria, for the late James Wild. He then (1874) went to Persia to complete the British Embassy buildings in Teheran; and four years afterwards was appointed an architect to the Royal Commission and agent to the Indian Government for the Paris Exhibition. Having rearranged the Indian collections at South Kensington, he, in 1880, visited India. On his return to England he was made a Companion of the Order of the Indian Empire, and Keeper of the Indian Section at South Kensington, where, in 1892, he was appointed Chief Keeper, and, in 1896, Art Director, of the Museum. He was knighted in 1902; and was appointed Royal Commissioner for the Paris Exhibition, 1900, and the St. Louis Exhibition, 1904. In the course of the evening a large silver cup, suitably inscribed, was presented to their guest in the name of the committee.

CHEAP SCHOOL BUILDINGS.—An important decision of the Board of Education was communicated to the Northumberland Education Committee at its meeting recently. Hitherto the Board has insisted upon very substantial school buildings being erected, but the Northumberland Committee, faced with a very large number of new schools to construct, many in districts where subsidences are common and where there is no guarantee of permanent population, wrote asking whether buildings less substantial than brick or stone would be accepted in districts with a liability to subsidence, where the population depends on a fluctuating industry, and where small schools are desirable owing to a sparse population, who could not bear the cost of expensive buildings. The reply of the Board of Education, communicated by the chairman, is to the effect that it is prepared to consider favourably proposals for buildings of the kind described in districts where they would come under any of the three heads mentioned, but that each case would be considered on its merits. The class of building the Education Committee proposes to put up would be of galvanised iron, lined with boards, and with a layer of felting between the outer and inner coverings. The Committee remarks that these buildings are much improved in appearance and design in the last few years, and their life when properly built is estimated as at least twenty-five years.—*Yorkshire Post.*

Legal.

THE WESTMINSTER PAVING LITIGATION.

THE case of Alcott *v.* The Mayor, etc., of Westminster came before the Lord Chief Justice and a special jury in the King's Bench Division on the 3rd inst.

On the case being called on, Mr. J. D. Crawford, on behalf of the plaintiff, applied for an adjournment. He said that on May 29 Mr. Justice Wills had made an order postponing the trial of the action. The plaintiff, in consequence of business engagements, had to leave England last October, and since then his solicitors had been changed. Plaintiff's leg had been amputated, and he had cabled that he was too ill to attend to business.

Mr. McCall, K.C., for the defendants, asked for judgment on the claim. As long ago as November 19, 1903, Mr. Justice Phillimore had made an order for a speedy trial, and Mr. Justice Wills, on May 20 last, made an order for a peremptory trial. After that it was said that the plaintiff had been in a railway accident. On the terms of paying costs to the amount of 70*l.*, a further postponement was allowed till July 3.

Mr. Crawford said he was not ready to go for trial. The defendants had obtained control of the streets and had also 1,000*l.* from the plaintiff, for the return of which he was now asking. The whole amount of the claim was about 18,000*l.*, and the counter-claim was over 30,000*l.* The plaintiff was willing to pay 300*l.*

The Lord Chief Justice said he thought Mr. Justice Wills's order should be carried out and judgment entered for the defendants on the plaintiff's claim with costs. The plaintiff must pay 64*l.*, and also the taxed costs of this application. The hearing of the counter-claim to be postponed to the first day of the Michaelmas Sittings, with liberty to apply. The paragraph in Mr. Justice Wills's order as to the defendants' control of the streets to be continued.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.

12,955 of 1904.—J. CALLIE: *Windows.*

This relates to a pivoted window, a portion of the lower part of which is hinged and so articulated to side pieces hinged to the window as to form therewith a collapsable ventilating hopper, which, when closed, pivots with the window, in combination with means for raising the window comprising a worm, worm wheel, crank and cross head, the latter acting on the lower pivot.

15,723 of 1904.—W. MALLINSON: *Self-sustaining Lift Gearing.*

This relates to self-sustaining lift gearing. The centre pulley supporting the cage has a screw thread formed on it, also a similar screw formed on the main shaft, so that when the hauling-wheel is sationary the load moves the centre pulley against the face plates, which are supported in a box with small rollers, forming one way clutches, to prevent the cage running down.

16,117 of 1904.—P. S. TRIGGS: *Disintegrating Machines.*

This invention relates to disintegrating machines. In carrying the invention into effect upon a rotating shaft is arranged a rotary element in the form of a drum, the external periphery of which is constructed of a toothed surface, the teeth being of a triangular shape, and being armoured by detachable and renewable beater plates on that surface of the tooth which receives the impact. This rotary element is arranged within a casing, and within the casing upon the internal periphery thereof is arranged a reaction device consisting of a series of pockets, the axis of each pocket being tangential to the drum, and so formed that any material caught by the breaking plates on the drum is delivered into one of the said pockets, and the latter having a round end returns the said material on to the same breaking plate or its successor at a high velocity.

16,475 of 1904.—W. Ross and T. Ross: *Apparatus for Flushing Water-closets.*

The apparatus consists mainly of a cistern fitted with an automatic closing valve for regulating the supply of water for flushing water-closets. The valve works in a seat fixed in the bottom of a cistern, to which is attached the down pipe leading to the closet. The valve is balanced by a counter-weight, which is suspended inside of a vertical tube fixed to the bottom of the cistern. This tube may also be utilised as an overflow, and to its upper end is fixed the fulcrum attachment for the lever for working the valve. The valve should be in two main parts, the cover or lifter, which is attached by a link to the lever, and counter-weight and the valve proper, which fits into the seat and detaches automatically from the cover or lifter to close the orifice to the down pipe. The action is as follows:—When at rest the cover or lifter is suspended upon a counter-weight above the valve proper, which is resting on the valve seat. The lever, on being pulled, brings the cover or lifter down on the valve, and on being released the counter-weight raises the valve which adheres by suction to the cover or lifter, for a regulated period, when it drops and closes the outlet. The apparatus is then in position for another flush so soon as the cistern has been refilled from the usual ball-cock.

16,796 of 1904.—F. FARNWORTH and T. PINKERTON: *Combined Ashpan and Fireguard for Domestic Fireplaces.*

This invention relates to a combined ashpan and fireguard for domestic fireplaces, and consists of a fireguard made of sheet metal, twisted metallic wire, or other material, same being placed vertically inside an ashpan in such a manner that it can be lifted up to any required height for the purpose of guiding the fireguard, when same is being lifted up. Projecting pieces are attached outside the fireguard, these projecting pieces, sliding in grooves, formed by strips of metal, attached to, or cast on inside faces of ashpan. The firegaurd is the same height as ashpan, and when fireguard is at its lowest position, its top

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

edge is level with the top edge of ashpan. When the fireguard is lifted up, it is supported, at any required height, by means of a catch, which is fulcrumed on a pin fixed in ashpan, the points or ends of cage engaging with corresponding projections formed on outside face of fireguard.

17,304 of 1904.—A. FIRTH: *Water-Heating and Steam-Generating Apparatus.*

This invention relates mainly to gas-heated boilers for use in connexion with the heating of water for domestic purposes, for hot-water circulation, and for general water-heating purposes. It is applicable also, however, to boilers heated otherwise than by gas, and used for steam generation or like purposes. The object of the invention is to provide means whereby the whole of the hot products of combustion given off by the burners or furnace may be utilised in the boiler. In constructing the apparatus the body of the boiler is vertical and is preferably cylindrical in form, the bottom of the water-chamber being slightly conical and having a slight upward cast towards the centre. The sides of the boiler are extended to a convenient distance below the conical base fo the water-chamber, forming a flange which (in a gas-heated boiler) serves as a heat trap, and at the same time prevents the emission of any fumes from beneath the boiler. The boiler is heated either by an annular burner or burners fitted immediately within the said boiler, or by means of a coal or other furnace immediately beneath the water-chamber, and the hot products of combustion are conducted through the water-chamber by means of a coiled pipe which leads from the apex of the conical bottom of the boiler, passes round and round within the boiler and discharges through the top of the boiler.

7,652 of 1905.—W. G. HEYS (THE INTERNATIONAL CONTRACT COMPANY): *Ventilators.*

A ventilator comprising a casing having a longitudinal passage there through and having expanded or funnel-shaped ends, a perforated web secured along its upper edge to the top wall of said casing and forming a chamber which communicates with the space to be ventilated, the side of bottom walls of said chamber being separated from the adjacent walls of said casing, and deflectors secured at the upper inner corners of said casing, extending downwardly and longitudinally therefrom and merging into and closing the ends of said chamber.

462 of 1905.—E. G. HARCOURT: *Door Fasteners.*

This relates to door fasteners, consisting in the combination of a retaining piece formed with or adapted for attachment to a door bolt casing but independently of the bolt aperture or barrel part, and a guard-chain with cage adapted for detachably engaging said retaining-piece, the parts being so formed and arranged that the required engagement and disengagement is effected by a lateral and rotary movement of the said slide.

813 of 1905.—A WHITLOCK and E. CARR: *Heating Apparatus Boilers.*

This invention relates to a system of joining together the different sections of sectional heating apparatus boilers. Hitherto they have been joined together by means of sockets cast on each section, in which are introduced either push nipples, screwed nipples, and the like, or by means of spigot and socket joints, with an india-rubber ring introduced, and by other means. According to the present invention, the sections are joined together by means of caulked joints, thereby obviating the necessity of machining the sockets and rendering the process far more simple and inexpensive.

8,594 of 1905.—J. PERKS: *Spigot and Socket Joint for Stoneware Pipes and the like.*

In carrying out the invention the inside of the socket is lined for about one-half its depth with a ring or lining of a composition formed preferably of gas tar, brimstone and sand, and the internal surface of this ring is made slightly elliptical instead of circular, the minor axis of the ellipse being slightly larger than the average smallest pivots across the end of the spigot. In making a joint the spigot end of a pipe is inserted in the socket of another, and it will probably be found that the spigot cannot be forced into the composition ring. The spigot is then turned round until a position is found in which it can be forced into the ring, and by twisting it when in the ring it is locked therein. The remaining portion of the socket is then filled in with cement.

5,543 of 1905.—W. E. MIKSCH: *Roofing Tiles.*

This relates to separately moulded or continuously formed grooved roofing tiles which, for the purpose of resting on the roofing laths, are provided on the underside with projecting lips, or supporting ribs characterised by the two lips or ribs arranged under the lateral grooves bearing with a projection against the roofing lath, and being provided along the outer lateral surfaces adjoining the grooves with recesses or grooves of such dimensions, and arranged opposite each other and extending beyond the two or one of the lateral grooves inwards, to such an extent that double-headed hooks for securing the tiles can be interposed from the underside of the roofing between the ribs of two adjoining tiles placed with their recesses or grooves facing each other and brought into engagement with the bottom surfaces of the recesses or grooves of the lips.

6,771 of 1905.—B. GIEBEL: *Stones for Building.*

The present invention relates to a special form for building stones, the principal features of which consists in their being of an angular shape, the two inner sides or surfaces of which are each provided with a projecting rib for use in securing said building stones together, and in using a specially-formed connecting or key-stone with suitable grooves or grooved top plate which are constructed to enagge with the ribs of the two angular-ribbed building stones placed beside each other, so that when the said stones are filled up with mortar or the like a solid block is formed. Said stones can thus be used either as stone blocks or if one is reversed and placed partly or entirely on the other they form a hollow stone.

6,993 of 1905.—THE BRITISH LUXFER PRISM SYNDICATE, LTD., and E. R. BARHAM: *Frames for Holding Electro-Glazed Glass or Prism Sections, Tile Sections and the like.*

An electro-glazed partition, or casement, consisting in the use of an interior frame channel section having the base portion of the channel integral except at one corner, in combination with a corner joint formed with an overlapping tongue, and cross-bars also formed with a tongue passing through the base of the channel section.

22,400 of 1904.—J. PICKERILL: *Fire-Proof Flooring.*

This flooring is made from a given quantity of coke-dust and cement. It is made in blocks to fit on girders so as to leave a ventilation for a current of air to pass through. The floor blocks fit between the girders at the bottom of the blocks, diminishing at the top to allow wet concrete to be inserted to make the whole a solid mass, except for the spaces left for ventilation through the floors. On the floor level perforated bricks are provided to meet the air ways through the blocks for ventilating the rooms. At each end of the blocks there are two spaces left out, so that after the blocks are jointed together with cement the spaces are filled in with wet concrete to strengthen the joint. At the bottom of the blocks there are two spaces left out to allow the wet concrete to go to the bottom of the steel girder flange. At each side of the top of the blocks there is one space left out to strengthen the block with wet concrete. After the floor is finished any kind of grenalitic paving will adhere to it, and to make a finished ceiling underneath, any kind of plaster may be used.

1,695 of 1905.—J. WOOD: *Flushing Cisterns.*

This consists of a cistern provided with a supplementary float and lever, and the end of said lever extending over the side of the cistern, in combination with a latching lever pivoted to the outer side of the cistern, and so formed and arranged as to engage and hold down the valve-operating lever of the cistern when such lever is lowered, and the said supplementary float lever designed, when the cistern is almost empty, to tilt the said latching lever, and thereby release the valve lever.

2,227 of 1905.—W. L. JACKSON: *Machines for Tunnelling or Cutting Earth, Rocks, and such like.*

A machine for tunnelling or cutting earth, rock, and such like, carried on a platform, which is mounted upon wheels, said machine comprising in combination a rotary cutter, connected with and driven by a hollow shaft, means for rotating the shaft, means for travelling the machine forward, a shoot connected with the hollow shaft, and a conveyor whereby the material cut by the cutter is automatically discharged at the rear of the machine.

4,093 of 1905.—F. H. BRENTON and J. STRUTHERS: *Cribbing or Shoring for Excavations.*

This invention relates to a cribbing, and more particularly to a cribbing especially adapted for use in digging graves and other deep excavating work. According to the invention the cribbing comprises in the main a series of side planks and cross stretchers. The side planks, each having secured to their inner faces, vertical metal straps, the straps of the upper planks having hooks at their lower ends, the straps of the lowest planks having eyes at their upper ends, and the straps of the intermediate planks having hooks and eyes at their opposite ends, permitting coupling of the straps and the suspension of the side planks from the upper planks, which latter have metal angle brackets secured to their ends to support the cribbing upon cross timbers. To the inner faces of the side planks adjacent to their ends are secured dove-tailed mortice boxes, to receive dove-tailed tenons on the ends of stretchers, and said tenons are strengthened by metal plates secured to the edges of the stretchers, and one of each pair of plates is made with a tenon longer than the wooden tenon at the end of the stretchers to limit the movement of said tenon through the boxes and hold the stretchers in proper position, and the boxes are recessed to receive said enlarged tenons and neatly close the same.

4,977 of 1904.—E. P. WELLS: *Reinforced Concrete Flooring.*

A method of constructing floors of reinforced concrete consisting in placing partially finished slabs and their supporting beams in position, with joint spaces between them, and in then covering the slabs fitting the joint spaces with concrete, the whole being secured together by borders projecting from the slabs and beams into the layer of concrete.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

June 20.—By PRALL & PRALL (at Dartford).	
South Darenth, Kent.—"South Darenth Roller Mill," with residence, area 4 a. 2 r. 7 p., f.	**£1,300**
By A. PRESTON, with WHITE, BERRY, & TAYLOR (at Ipswich).	
Great Bealings, Suffolk.—Freehold farm, 47 a. 1 r. 29 p.	**720**
By THURGOOD & MARTIN (at Guildford).	
Stoke-next-Guildford, Surrey.—A freehold enclosure, 3 a. 0 r. 2 p.	**950**
Enclosure with osier bed, 8 a. 1 r. 9 p., f.	**100**
Five cottages and 2 a. 1 r. 6 p.	**500**
"Slyfield Farm," 53 a. 0 r. 4 p., f.	**3,500**
A freehold estate, 27 a. 0 r. 21 p.	**1,500**
Part of "Park Barn" and "Guildford Park" Farms, 70 a. 0 r. 4 p., f.	**2,100**
Woking, etc., Surrey.—"Burpham Court Farm," 114 a. 1 r. 25 p., f. (with the Manor of Burpham)	**4,000**
Worplesdon, Surrey.—"Messenger's Farm," 57 a. 3 r. 1 p., f.	**2,650**
"Fishpond Meadow," 5 a. 2 r. 14 p., f.	**120**
A freehold enclosure, 11 a. 0 r. 31 p.	**170**
Send, Surrey.—"New Barns Estate," 41 a. 3 r. 4 p., f.	**1,500**
"Sendbarns Farm," 129 a. 3 r. 21 p., f.	**3,350**
Freehold farmhouse and 17 a. 2 r. 19 p.	**475**
June 22.—By THORNBORROW & Co. (at Penruddock).	
Greystoke, Cumberland.—Farmhouse and 11 a. 1 r. 37 p., f.	**725**
By THORNBORROW & Co. (at Troutbeck).	
Matterdale, etc., Cumberland.—Farmhouse and 60 acres, f. and c.	**1,055**
Three enclosures, 12 acres, f.	**471**
June 23.—By HATCH, WATERMAN, & SON (at Tenterden).	
Tenterden, Kent.—"Upper Huntbourne Farm," 133 a. 0 r. 39 p., f.	**1,700**
June 24.—By SEXTON & GRIMWADE (at Colchester).	
Aldham, etc., Essex.—"The Hill Farm," 141 a. 2 r. 0 p., f.	**1,500**
Little Bromley, Essex.—Norman's and Rudkin's Farms, 86 a. 0 r. 8 p., c., y.r. 80l.	**1,850**
By WRIGHT & SCRUBY (at Cambridge).	
Longstanton, Cambs.—Market garden land, 32 a. 1 r. 8 p., f.	**1,200**
Market garden ground, 5 a. 2 r. 17 p., f.	**345**
A freehold allotment, 10 acres	**480**
Two freehold fields, 16 a. 2 r. 17 p.	**1,010**
Three freehold cottages and 1 a. 1 r. 16 p.	**200**
"Hatton's Farm," 214 a. 3 r. 37 p., f.	**5,525**
Freehold house and shop, y.r. 15l.	**300**
"The Church Close," 4 a. 3 r. 37 p., f.	**225**
Two freehold cottages and 0 a. 1 r. 33 p.	**120**
Swavesey, Cambs.—A copyhold field, 6 a. 2 r. 22 p.	**120**
By EVANS & EVANS (at Stafford).	
Bradly, Staffs.—Freehold land, with buildings, 44 a. 2 r. 29 p.	**1,510**
Derrington, Staffs.—"Stallbrook Hall Farm," 88 a. 0 r. 25 p., f.	**2,000**
June 26.—By C. RAWLEY CROSS & Co.	
Shepherd's Bush.—7, Ingersoll-rd., u.t. 80 yrs., g.r. 6l. 10s., e.r. 42l.	**385**
Acton.—17 and 19, Whitehall-gdns., u.t. 97 yrs., g.r. 16l., e.r. 90l.	**870**
By DRIVERS'.	
Holloway.—9 to 17 (odd), Hertslet-rd., f., y.r. 170l.	**2,410**
By ELLIOTT, SON, & BOYTON.	
Marylebone.—8 and 9, Devonshire-st., u.t. 5 yrs., g.r. 120l., y.r. 360l.	**600**
10, Devonshire-st., u.t. 10 yrs., g.r. 50l., y.r. 180l.	**740**
51, Devonshire-st., u.t. 5 yrs., g.r. 50l., y.r. 170l.	**450**
22A, Devonshire-st., u.t. 20 yrs., g.r. 34l., y.r. 160l.	**1,020**
By HUMBERT & FLINT.	
Fingest, Bucks.—Cadmore End Common, two freehold meadows, 8 a. 1 r. 1 p., also six cottages	**660**
Cadmore End Common, "Botany Bay" and 1 a. 1 r. 8 p., f.	**165**
By KEMSLEYS'.	
Tottenham.—101, Northumberland-pk., u.t. 45 yrs., g.r. 3l. 3s., y.r. 28l.	**220**
By WEATHERALL & GREEN.	
Seaford, Sussex.—Steine-rd., "Denmark House," f., y.r. 40l.	**675**
1 and 2, Gladstone Villas, f., y.r. 40l. 16s.	**575**
Saxon-la., f.g.r. 15l., reversion in 83 yrs.	**380**
Folkestone, Kent.—34 and 36, East Cliff, f., w.r. 40l. 6s.	**410**
Gravesend, Kent.—79 and 80, New-rd. (s.), f., y.r. 110l.	**2,300**
9, 20, 21, and 23, Parrock-st., f., y.r., 75l.	**1,155**
Clewer, Berks.—Hatch-la., The Clewer Steam Laundry, y.r. 60l., also 3 closes adjoining, 6 acres f.	**2,140**
Bethnall Green.—Chisenhale-rd., f.g.r. 22l. 10s., reversion in 66 yrs.	**500**
Ellesmere-rd., f.g.r. 20l., reversion in 60 yrs.	**510**
Hackney.—236, 238, 244, and 246, Richmond-rd., u.t. 40 yrs., g.r. nil, y.r. 200l.	**1,840**

By MORGAN, BAINES, & CLARK.
Sutton, Surrey.—2, 4, and 6, High-st. (s.), u.t. 58 yrs., g.r. 75*l.*, y.r. 415*l.* £6,400

By MARTIN, CLARKE, & Co.
Stratford.—77 and 79, Carnarvon-rd., f., p. .. 1,440
Buckhurst Hill.—1, 2, and 3, Prince's-ter., u.t. 63¾ yrs., g.r. 9*l.*, w.r. 46*l.* 16s. 195

By RUTTERS'.
Southminster, Essex. — "Bellbrook Farm," 48 a. 3 r. 8 p., f., p. 1,500

By LANGRIDGE & FREEMAN (at Battle).
Whatlington, Sussex.—"Leeford Estate," 92 a. 1 r. 31 p., f., y.r. 90*l.* 1,935
Five freehold enclosures, 25 a. 1 r. 15 p. .. 325

June 27.—By CURTIS & HENSON.
Aboyne, etc., Aberdeenshire.—The estate of Glen Tana, area 29,200 acres 155,000

By DEBENHAM, TEWSON, & Co.
Woldingham, Surrey.—"Church Farm," 40 a. 0 r. 30 p., f., y.r. 62*l.* 12s. 4,600
Sampford Courtenay, Devon. — "Higher Dornaford Farm," 139 a. 1 r. 15 p., f., y.r. 30*l.* 810
Norwood.—33, Belvedere-rd., f., p. 800
35, Belvedere-rd., u.t. 52 yrs., g r. 11*l.* 13s. 4d., y.r. 50*l.* 350
11, Westow-hill (s), u.t. 41½ yrs., g.r. 60*l.*, y.r. 83*l.* 140
12, 14, and 16, Westow-hill (s.), f., y.r. 510*l.* 8,200
Woodland Hill, a block of land, area 8,000 ft., f. 250
14 and 15, High-st. (s.), f., y.r. 100*l.* 1,600
High-st., f.g.r. 24*l.*, reversion in 47½ yrs. .. 700
17A and 18A, High-st. (s.), f., y.r. 130*l.* 2,660
Forest Hill.—33, Dartmouth-rd. (s.), f., y.r. 25*l.* 500
29, Dartmouth-rd. (s.), with stabling, f., y.r. 95*l.* 13s. 1,450
Wimbledon.—Church-rd., f.g.r. 10*l.* 10s., reversion in 44 yrs. 260
St. Luke's.—82, Bath-st., a profit rental of 30*l.* for 13 yrs. 125

By C. W. DAVIES & SON.
Kentish Town.—Queen's-cres., f.g.r. 6*l.* 6s., reversion in 45½ yrs. 140
Camberwell.—50 and 52, Lilford-rd., u.t. 63 yrs., g.r. 9*l.*, w.r. 78*l.* 580
Brixton.—64, Geneva-rd., u.t. 61 yrs., g.r. 6*l.* 10s., y.r. 36*l.* 260
Stockwell.—43, Hargwyne-st., u.t. 72 yrs., g.r. 5*l.*, w.r. 39*l.* 285

By JONES, SON, & DAY.
West Ham.—197 and 199, Vicarage-la., f., y.r. 58*l.* 12s. 555
Stratford.—7 and 9, Leytonstone-rd. (s.), u.t. 51 yrs , g.r. 50*l.*, y.r. 130*l.* 890
Leyton.—195, Harrow-rd. (s.), f., e.r. 35*l.* 335
Walthamstow.—125, Grove-rd. (s.), u.t. 91 yrs., g.r. 7*l.*, y.r. 35*l.* 315
Loughton.—39, Smart's-la., f., w.r. 19*l.* 10s... 190
Poplar.—208, High-st. (s.), f., y.r. 30*l.* 440
Edmonton.—10, Denton-rd. (s.), and plot of land adjoining, f., p. 445
23 and 24, Raynham-av., f., y.r. 54*l.* 10s... 550
Hampton, Middx.—Percy-rd., a freehold house and shop, e.r. 40*l.* 500

By RUTLEY, SON, & VINE.
Holloway.—9 and 11, Dalmeny-av., u.t. 14¼ yrs., g.r. 21*l.*, y.r. 140*l.* 315
Crouch End.—129 to 135 (odd), 139, 141, and 143, Park-rd., u.t. 73 yrs., g.r. 48*l.* 6s., y.r. 198*l.* 1,790
Norwood.—2, 4, and 6, Denmark-rd., f., w.r. 58*l.* 10s. 470
Penge.—5, 6, 7, and 8, Challin-st., f., w.r. 91*l.* 715
Selhurst.—10, 11, 12, and 13, Wisbeach-rd., u.t. 59½ yrs., g.r. 10*l.*, w.r. 65*l.* 310
Penge.—1, 2, 3, and 4, Challin-st., u.t. 62 yrs., g.r. 15*l.*, w.r. 96*l.* 4s. 405
79 and 81, Maple-rd., u.t. 62 yrs., g.r. 12*l.*, w r. 54*l.* 12s. 250
34, Laur l gr., u.t. 49½ yrs., g.r. 5*l.*, w.r. 32*l.* 10s. 125

By WALTER SIMMONDS.
Forest Gate.—Henderson-rd., i.g. rents 36*l.* 8s., u.t. 85 yrs., g.r. 17*l.* 2s. 310

By R. TIDEY & SON.
Islington.—4, Ockendon-rd., u.t. 36 yrs., g.r. 6*l.* 10s., y.r. 45*l.* 375

By FREDK. WARMAN.
Stoke Newington.—34, Lordship-pk., and 1¼th of an acre, u.t. 62 yrs., g.r. 30*l.* 10s., p... 1,700
119, Bouverie-rd., u.t. 72 yrs., g.r. 5*l.*, y.r. 32*l.* 350
Holloway.—144, Hornsey-rd. (s.), u.t. 37 yrs., g.r. 8*l.*, e.r. 50*l.* 265
Highbury.—8, Stavordale-rd., u.t. 71 yrs., g.r. 8*l.*, e.r. 50*l.* 470
Dalston.—85, Graham-rd., u.t. 53 yrs., g.r. 6*l.*, e.r. 44*l.* 465
St. John's Wood.—42 and 43, New-st., u.t. 22 yrs., g.r. 10*l.*, w.r. 135*l.* 4s. 575
Forest Gate.—6, Godwin-rd., f., e.r. 36*l.* 8s... 340
Bermondsey.—20, 22, and 38, Drummond-rd., u.t. 28½ yrs., g.r. 9*l.*, w.r. 105*l.* 6s. 540

By A. CECIL GRIMWADE (at Ipswich).
Layham, etc., Suffolk.—"Water House Farm," 139 a. 2 r. 16 p., f. and c. 2,500
"Shelley Fen," 6 a. 3 r. 4 p., f., p. 235
Raydon, etc., Suffolk.—"The Woodlands" and 83 a. 2 r. 28 p., f. and c. 2,000
"Brimlin Wood," 35 a. 0 r. 17 p., f. 1,175
Eight freehold cottages 395

By WINCH & SONS (at Ashford).
Biddenden, Kent.—"River Hall" and 103 a. 1 r. 39 p., f. 2,050
"Goose Green" and 2 a. 0 r. 34 p., f. 300
"Birchley" and 45 a. 1 r. 14 p., f. 1,550
"Medhurst" and 18 a. 2 r. 24 p., f. 540
Four enclosures, 32 a. 0 r. 11 p., f. 810
Frittenden, Kent.—"Stone Court Farm," 57 a. 1 r. 27 p., f. 1,200
"Whitsunden Farm," 61 a. 0 r. 11 p., f. .. 1,050
High Halden, Kent.—"Batchelor Farm," 53 a. 0 r. 20 p., f. 1,070

June 28.—By HUMBERT & FLINT.
Hope Bagot, etc., Salop.—"The Hope Court Estate," 416 a. 2 r. 37 p., f. 12,400

By BUCKLAND & SONS.
Warfield, Berks.—"Jealots Hill Farm," 243 a. 0 r. 9 p., f. £6,500
Three cottages and several enclosures, 47 a. 1 r. 36 p., f. 1,200
Wellyers-la., two enclosures, 13 a. 3 r. 19 p., f. 1,100
Bishops-la., a freehold enclosure, 5 a. 3 r. 37 p. 280
"Hayley Green Farm," 55 a. 0 r. 36 p., f. 2,200

By HAMPTON & SONS.
East Grinstead, Sussex.—"Lingfield Lodge" and 2 acres, f., p. 2,800
Newick, Sussex.—"Newick Lodge," also a cottage, area 4¼ acres, f., p. 1,700
Chailey, Sussex. — A freehold occupation, 20 a. 1 r. 19 p. 420

By MAY & PHILPOT.
Brixton.—24, Rayleigh-gdns., u.t. 85¼ yrs., g.r. 12*l.*, p. 800
Wandsworth —95, Earlsfield-rd., u.t. 84 yrs., g.r. 9*l.* 15s., e.r. 48*l.* 475
Streatham.—40, Gleneagle-rd., u.t. 76½ yrs., g.r. 14*l.* 8s., e r. 65*l.* 550

By RUSHWORTH & STEVENS.
Hastingleigh, Kent.—Great Combe, Little Combe, and Steeple Lees Farms, 565 a. 0 r. 13 p., f., y.r. 309*l.* 18s. 3,950
Kentish Town.—Litcham-st., f.g. rents 44*l.*, reversion in 49½ yrs. 1,075

By THURGOOD & MARTIN.
Pyrford, Surrey.—Freehold cottage and 0 a. 2 r. 15 p. 240
Two cottages and 25 a. 2 r. 9 p., f. 1,075
Byfleet-la., enclosure of land, 5 a. 2 r. 10 p., f. 330
Upshot-la , enclosure of land, 9 a. 2 r. 2 p., f. 390
Sandy-la., etc., enclosure of land, 27 a. 3 r. 21 p., f. 1,010
Sandy-la., freehold allotment, 21 a. 2 r. 4 p. 745
Pyrford-green, two cottages and 0 a. 2 r. 16 p., f. 250
Pyrford-green, enclosure of land, 1 a. 1 r. 13 p., f. 120
"Asparagus Farm," 36 a. 2 r. 4 p., f., y.r. 67*l.* 2s. 2,000
"Pyrford Place Farm," 115 a. 0 r. 19 p., f. 4,500
Part of "Walsham Meadow," 8 a. 2 r. 0 p., f. 250
Old Woking, Surrey.—High-st. (near), pasture land, 3 a. 0 r. 34 p., f. 120
Send, Surrey.—Enclosure of land, 8 a. 2 r. 10 p., f. 260
Bisley Common, Surrey.—"Hangmoor Close," 5 a. 3 r. 1 p., f. 230
Bagshot, Surrey.—A freehold plot of land, 1 acre 215
Egham, Surrey.—Parker's Hill Brickfield, 6 a. 3 r. 7 p., f., p. 700

By G. TROLLOPE & SONS.
Westminster.—27, Abingdon-st. and 6, College-mews, area 2,666 ft., f.; y.r. 240*l.* .. 7,400

By WAGSTAFF & SONS.
Barnsbury.—26, Rhodes-st., u.t. 53 yrs., g.r. 4*l.* 4s., y.r. 27*l.* 18s. 245

By DOUGLAS YOUNG & Co.
South Lambeth.—13, Lansdowne-gdns., u.t. 56 yrs., g.r. 6*l.*, y.r. 42*l.* 400
Stockwell.—8, Burnley-rd., u.t. 58½ yrs., g.r. 6*l.* 10s., y.r. 45*l.* 410

By CRONKS' (at Sevenoaks).
Otford, etc., Kent.—Rye-la., three enclosures, 12 a. 3 r. 3 p., f. 620
Main-rd., a freehold enclosure, 11 a. 3 r. 4 p. 600
Westerham Hill, Kent.—London-rd., freehold building land, 3 acres 300

June 29.—By BROWETT & TAYLOR.
Catford.—114, Wellmeadow-rd., u.t. 990 yrs., g.r. 7*l.* 1s., p 340
Croydon.—1, Wortley-rd., f., w.r. 15*l.* 12s. .. 120
134 and 136, Canterbury-rd., f., w.r. 31*l.* 4s. 290

By J. H. BULMER.
Deptford.—11, Hoopwick-st., u.t. 62½ yrs., g.r. 5*l.*, w.r. 46*l.* 16s. 385

By FAREBROTHER, ELLIS, & Co.
Wandsworth. — Maskell-rd., etc , freehold building land, 3¼ acres 2,000
Hildenborough, Kent.—A freehold estate, 68 a. 0 r. 31 p., p. 3,350

By HERRING, SON, & DAW.
St. Luke's.—326, Old-st. (s.), f., y.r. 80*l.* 1,600
Bishopsgate.—5, Devonshire-sq. ("Wheeler's Hotel"), area 1,850 ft., f., y.r. 190*l.* 5,000
Streatham —5, Mount Nod-rd., f., y.r. 110*l.*... 1,850
95, Barrow-rd., u.t. 73½ yrs., g.r. 7*l.* 7s., e.r. 42*l.* 325

By C. C. & T. MOORE.
Bow.—10, 12, and 14, Trellis-st., u.t. 67 yrs., g.r. 12*l.* 12s., w.r. 98*l.* 16s. 620
Bromley.—49 to 53, Orwell-rd., f., w.r. 154*l.* 1s. 1,460
Hackney.—45, Glenarm-rd., u.t. 62½ yrs., g.r. 7*l.*, w.r. 44*l.* 4s. 265
Stratford.—6 and 8, Buxton-rd., u.t. 54½ yrs., g.r. 8*l.*, w.r. 67*l.* 12s. 395
Maryland-rd., "The B ar's Head," b.h., f., y.r. 25*l.* 500
Forest Gate.—38 to 44 (even), Godwin-rd., u.t. 72½ yrs., g.r. 12*l.* 12s., w.r. 153*l.* 8s. 950
Mile End.—624, Mile End-rd. (shop and workshop), f., y.r. 70*l.* 1,010

By NEWBON, EDWARDS, & SHEPHARD.
Barnsbury.—25, 27, 29, 30, 31, 32, 33, and 34, Cumberland-st., u.t. 51 yrs., g.r. 41*l.* 10s., y.r. 342*l.* 2,555
Stoke Newington.—24, Farleigh-rd., u.t. 60 yrs., g.r. 7*l.*, y.r. 38*l.* 330
Hackney.—36, Bodney-rd., u.t. 67 yrs., g.r. 8*l.*, y.r. 40*l.* 330
Dalston.—119 and 121, Sandringham-rd., u.t. 56 yrs., g.r. 12*l.*, y.r. 80*l.* 670
39, Norfolk-rd., y.r. 38*l.*, also i.g.r 5*l.* 10s., u.t. 56 yrs., g.r. 11*l.* 300
Stepney.—142, 144, and 146, Charles-st., c., w.r. 75*l.* 8s. 1,050
Clerkenwell.—59, Exmouth-st. (s.), u.t. 10½ yrs., g.r. 6*l.*, e.r. 70*l.* (including goodwill) 310
Holloway.—110, Carleton-rd., u.t. 47 yrs., g.r. 7*l.* 17s. 6d., y.r. 75*l.* 570
Dulwich.—312, Lordship-la., u.t. 89 yrs., g.r. 8*l.*, y.r. 45*l.* 390

By ROBINS, GORE, & MERCER.
Soho.—24, Dean-st., area 1,100 ft., f., e.r. 150*l.* £2,400
Leicester-square. — 6, St. Martin's-st., u.t. 10 yrs., g.r. 125*l.*, w.r. 239*l.* 4s. 115
Marylebone.—14, Charlotte-st. (s.), u.t. 16 yrs., g.r. 90*l.*, w.r. 202*l.* 16s. 170
Pimlico.—57, Hanover-st., u.t. 19½ yrs., g.r. 7*l.*, w.r. 62*l.* 4s. 150

By STIMSON & SONS.
South Kensington.—27, Cathcart-rd., and 16, Hollywood-rd., u.t. 43½ yrs., g.r. 15*l.*, y.r. 121*l.* 990
Battersea.—Salcott-rd., f.g.r. 6*l.* 6s., reversion in 71½ yrs. 160
34 and 36, Culvert-rd., also "Crown Cottage" in rear, f., w.r. 70*l.* 4s. 500
Camberwell.—39 to 45 (odd), Ivanhoe-rd., u.t. 71½ yrs., g r. 19*l.*, e.r. 120*l.* 910
Hounslow.—Bath-rd., "Westbrook House," f., y.r. 55*l.* 680
Brixton.—34 and 36, Josephine-av., u.t. 60¼ yrs., g.r. 18*l.*, y.r. 110*l.* 880
24, Solon-rd., u.t. 62½ yrs., g.r. 6*l.* 10s., y.r. 32*l.* 290
9, Brading-rd., u.t. 76½ yrs., g.r. 7*l.*, y.r. 34*l.* 300
Abbess Roding, Essex.—"Greenhill Farm," 30 a. 1 r. 8 p., f. and c., y.r. 30*l.* 600

By E. & A. SWAIN.
Bayswater.—82, Kensington Pk.-rd., f , y.r. 95*l.* 1,100
Notting Hill.—7, Blechynden-st., u.t. 61 yrs., g.r. 7*l.*, w.r. 44*l.* 4s. 200
8, Johnson-st., u.t. 44 yrs., g r. 5*l.*, w.r. 44*l.* 4s. 230
40 and 42, Treverton-st., u.t. 58 yrs., g.r. 16*l.*, w.r. 64*l.* 8s. 350

By WM. WESTON.
Kensal Rise.—64, 66, and 70, Chamberlayne Wood-rd. (s.), u.t. 84 yrs., g.r. 42*l.*, y.r. 255*l.* 3,575

By TRESIDDER & Co.
Winsley, Wilts.—"Winsley Croft," f. 400

By HENRY HENDRIKS (at Birmingham).
Sutton Coldfield, Warwick.—Highbridge-rd., "West Farleigh," f., p. 715
Halesowen, Worcester.—Aubrey-rd., two-corner building sites, area 9,037 yds., f. 1,356

June 30.—By BELCHER, ADKIN, & Co.
East Challow, Berks.—A freehold meadow, 6 a. 3 r. 38 p. 315
"Challow Hill Farm," 62 a. 1 r. 5 p., f. .. 3,500
Letcombe Regis, Berks.—Ickleton Pk. enclosure, 88 a. 2 r. 27 p., f. 2,020
The Bablakes Pk., 65 a. 3 r. 26 p., f. 1,720
"The Manor Farm," 554 a. 1 r. 18 p., f. .. 5,000
Wantage, etc., Berks.—"Harris Farm," 57 a. 3 r. 11 p., f. 560

By H. DONALDSON & SONS.
Hoxton.—9 and 11, Northport-st., u.t. 27½ yrs., g.r. 7*l.*, y.r. 62*l.* 400
Poplar.—Arcadia-st., i.g.r. 62*l.*, u.t. 58 yrs., g.r. 37*l.* 10s. 365
Dalston.—73, 79 to 89 (odd), Richmond-rd., y.r. 301*l.*, also i.g.r. 18*l.* 15s., u.t. 40 yrs., g.r. 55*l.* 2,565
42, 44, 46, 50, 52, and 54, Malvern-rd., u.t. 42 and 41 yrs., g.r. 33*l.*, y.r. 241*l.* 1,700
31 to 39 (odd), Lavender-gr., u.t. 37 yrs., g.r. 11*l.* 5s., y.r. 156*l.* 12s. 1,490

By FOLKARD & HAYWARD.
Portman Square.—9, Upper Montague-st. (s.), u.t. 10½ yrs., g r. 80*l.*, y.r. 198*l.* 8s. 315

By MOORE & TEMPLE.
Fulham.—45, Coniger-rd., u.t. 79½ yrs., g.r. 2*l.*, y.r. 40*l.* 505

By REYNOLDS & EASON.
Hendon.—"The Hyde," Springfield, and 8¼ acres, f.p. 3,500

By FRED VARLEY & SON.
Finsbury Park.—26 and 29, Avenell-rd., f., y.r. 68*l.* 1,050
Holloway.—37, Hilldrop-cres., u.t. 43½ yrs., g.r. 8*l.*, y.r. 55*l.* 380

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beerhouse; p.h. for public-house; o. for offices; s. for shops; ct. for court.

MEETINGS.

FRIDAY, JULY 7.

Royal Institute of British Architects.—The President's "At Home." Exhibition of Decorative Art. 8.30 to 11.

SATURDAY, JULY 8.

Northern Architectural Association.—Students' Sketching Club Excursion.

Edinburgh Architectural Association.—Annual Excursion, to Dunkeld Cathedral, Murthly Castle, and Stobhall.

FRIDAY, JULY 14.

Incorporated Association of Municipal and County Engineers.—South Wales District Meeting, to be held at Swansea.

SATURDAY, JULY 15.

Incorporated Association of Municipal and County Engineers.—Swansea Meeting (concluded).

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China Ceylon, etc., 28s. per annum. Remittances (payable to J MORGAN) should be addressed to the Publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers), can ensure receiving "The Builder" by *Friday Morning's Post.*

TO CORRESPONDENTS.

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, photographs, manuscripts, or other documents, or for models or samples, sent to or left at this office, unless he has specially asked for them.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and *not* to the Editor.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 10 0	per 1000 alongside, in river.
Rough Stocks and Grizzles	1 6 6	„ „ „
Facing Stocks	2 2 0	„ „ „
Shippers	2 2 0	„ „ „
Flettons	1 7 0	„ at railway depôt.
Red Wire Cuts	1 14 0	„ „ „
Best Fareham Red	3 12 0	„ „ „
Best Red Pressed Ruabon Facing	5 0 0	„ „ „
Best Blue Pressed Staffordshire	4 2 6	„ „ „
Do. Bullnose	4 7 6	„ „ „
Best Stourbridge Fire Bricks	4 0 0	„ „ „

GLAZED BRICKS.

Best White and Ivory Glazed Stretchers	12 0 0	„ „ „
Headers	11 0 0	„ „ „
Quoins, Bullnose, and Flats	16 0 0	„ „ „
Double Stretchers	19 0 0	„ „ „
Double Headers	16 0 0	„ „ „
One Side and two Ends	19 0 0	„ „ „
Two Sides and one End	20 0 0	„ „ „
Splays, Chamferred, Squints	20 0 0	„ „ „
Best Dipped Salt Glazed Stretchers, and Header	12 0 0	„ „ „
Quoins, Bullnose, and Flats	14 0 0	„ „ „
Double Stretchers	15 0 0	„ „ „
Double Headers	14 0 0	„ „ „
One Side and two Ends	15 0 0	„ „ „
Two Sides and one End	15 0 0	„ „ „
Splays, Chamferred, Squints	14 0 0	„ „ „
Second Quality White and Dipped Salt Glazed	2 0 0	„ less than best.

	s. d.	
Thames and Pit Sand	7 0	per yard, delivered.
Thames Ballast	5 9	„ „
Best Portland Cement	27 0	per ton, „
Best Ground Blue Lias Lime	20 0	„ „

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime.....12s. 0d. per yard, delivered.
Stourbridge Fireclay in sacks 27s. 0d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington Depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	„ „
PORTLAND STONE (20 ft. average)—Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 1	„ „
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	„ „

	s. d.	
Ancaster in blocks	1 11	per ft. cube, deld. rly. depôt.
Beer „	1 6	„ „
Greenshill „	1 10	„ „
Darley Dale in blocks	2 4	„ „
Red Corsehill „	2 5	„ „
CloseburnRedFreestone	2 0	„ „
Red Mansfield „	2 4	„ „

YORK STONE—*Robin Hood Quality.*

Scappled random blocks	2 10	„ „
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 8	per ft. super. „
6 in. rubbed two sides ditto, ditto	2 6	„ „
3 in. sawn two sides slabs (random sizes)	0 11½	„ „

STONE (*continued*).

YORK STONE—*Robin Hood Quality* (*continued*).

	s. d.	
2 in. to 2½ in. sawn one side slabs (random sizes)	0 7½	per ft. spr., deld. rly. depôt.
½ in. to 2 in. ditto, ditto	0 6	„ „

HARD YORK—

Scappled random blocks	3 0	per ft. cube, „
6 in. sawn two sides, landings to sizes (under 40 ft. super.)	2 8	per ft. super. „
6 in. rubbed two sides ditto	3 0	„ „
3 in. sawn two sides (slabs random sizes)	1 2	„ „
2 in. self-faced random flags	0 5	„ „

	s. d.	
Hopton Wood (Hard Bed) in blocks	2 0	per ft. cube. deld. rly. depôt.
„ „ „ 6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
„ „ „ 3 in. sawn both sides random slabs	1 0	„ „
„ „ „ 2 in. do.	0 8½	„ „

SLATES.

in. in.	£ s. d.	
20 × 10 best blue Bangor	13 2 6	per 1000 of 1200 at r. d.
20 × 12 „ „	13 17 6	„ „
20 × 10 first quality „	13 0 0	„ „
20 × 12 „ „ „	13 15 0	„ „
16 × 8 „ „ „	7 5 0	„ „
20 × 10 best blue Portmadoc	12 12 6	„ „
16 × 8 „ „	6 12 6	„ „
20 × 10 best Eureka unfading green	15 17 6	„ „
20 × 12 „ „	18 7 6	„ „
18 × 10 „ „	13 5 0	„ „
16 × 8 „ „	10 5 0	„ „
20 × 10 permanent green	11 12 6	„ „
18 × 10 „ „	9 12 6	„ „
16 × 8 „ „	6 12 6	„ „

TILES.

	s. d.	
Best plain red roofing tiles	42 0	per 1000 at rly. depôt.
Hip and Valley tiles	3 7	per doz. „ „
Best Brosely tiles	50 0	per 1000 „ „
Do. Ornamental tiles	52 6	„ „ „
Hip and Valley tiles	4 0	per doz. „ „
Best Ruabon red, brown, or brindled do. (Edwards)	57 6	per 1000 „ „
Do. Ornamental do	60 0	„ „ „
Hip tiles	4 0	per doz. „ „
Valley tiles	3 0	„ „ „
Best Red or Mottled Staffordshire do. (Peakes)	51 9	per 1000 „ „
Do. Ornamental do	54 6	„ „ „
Hip tiles	4 1	per doz. „ „
Valley tiles	3 8	„ „ „
Best "Rosemary" brand plain tiles	48 0	per 1000 „ „
Best Ornamental tiles	50 0	„ „ „
Hip tiles	4 0	per doz. „ „
Valley tiles	3 8	„ „ „
Best "Hartshill" brand plain tiles, sand faced.	50 0	per 1000 „ „
Do. pressed	47 6	„ „ „
Do. Ornamental do	50 0	„ „ „
Hip tiles	4 0	per doz. „ „
Valley tiles	3 6	„ „ „

WOOD.

BUILDING WOOD.	At per standard. £ s. d.	£ s. d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in	13 10 0	15 0 0
Deals: best 3 by 9	13 0 0	14 0 0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 0 0	12 0 0
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.
Deals: seconds	1 0 0	less thn best.
Battens: seconds	0 10 0	„ „ „
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	10 0 0
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0
Foreign Sawn Boards—1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.
¾ in.	1 0 0	„

	At per load of 50 ft.	
Fir timber: best middling Danzig or Memel (average specification)	4 10 0	5 0 0
Seconds	4 0 0	4 10 0
Small timber (8 in. to 10 in.)	3 12 6	3 15 0
Small timber (6 in. to 8 in.)	3 0 0	3 10 0
Swedish balks	2 10 0	3 0 0
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0

JOINERS' WOOD.	At per standard. £ s. d.	£ s. d.
White Sea: first yellow deals, 3 in. by 11 in	24 0 0	25 0 0
3 in. by 9 in.	22 0 0	23 0 0
Battens, 2½ in. and 3 in. by 7 in.	16 10 0	18 0 0
Second yellow deals, 3 in by 11 in.	18 10 0	20 0 0
„ „ 3 in. by 9 in.	17 10 0	19 0 0
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0
Third yellow deals, 3 in. by 11 in. and 9 in.	13 10 0	15 0 0
Battens, 2½ in. and 3 in. by 7 in.	11 0 0	12 0 0
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0
Do. 3 in. by 9 in.	18 0 0	19 10 0
Battens	13 10 0	15 0 0
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0
Do. 3 in. by 9 in.	14 10 0	16 0 0
Battens	11 0 0	12 10 0
Third yellow deals, 3 in. by 11 in.	13 0 0	14 0 0
Do. 3 in. by 9 in.	12 10 0	14 0 0
Battens	10 0 0	11 0 0
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0
„ „ 3 in. by 9 in.	13 10 0	14 10 0
Battens	11 0 0	12 0 0
Second white deals, 3 in. by 11 in.	13 10 0	14 10 0
„ „ 3 in. by 9 in.	12 10 0	13 10 0
„ „ battens	10 0 0	11 0 0

WOOD (*continued*).

JOINERS' WOOD (*continued*).	At per standard. £ s. d.	£ s. d.
Pitch-pine: deals	16 10 0	20 0 0
Under 2 in. thick extrs	0 10 0	1 0 0
Yellow Pine—First, regular sizes	44 0 0	upwards.
Oddments	32 0 0	„
Seconds, regular sizes	33 0 0	„
Yellow Pine oddments	28 0 0	„
Kauri Pine—Planks, per ft. cube	0 3 6	0 5 0
Danzig and Stettin Oak Logs—Large, per ft. cube	0 3 0	0 3
Small „ „	0 2 6	0 2
Wainscot Oak Logs, per ft. cube.	0 5 0	0 5
Dry Wainscot Oak, per ft. sup. as inch	0 0 8	0 0 9
¾ in. do. do.	0 0 7	—
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch	0 0 9	0 1 0
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 6
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0
Teak, per load	17 0 0	22 0 0
American Whitewood Planks, per ft. cube	0 4 0	0 5 0

Prepared Flooring, etc.—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 0 0
1 in. by 7 in. white, planed and shot	0 12 0	0 14 6
1 in. by 7 in. white, planed and matched	0 12 6	0 15 0
1¼ in. by 7 in. white, planed and matched	0 15 0	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0 11 0	0 13 6
1 in. by 7 in. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do.	0 12 9	0 15 0

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £ s. d.	£ s. d.
Rolled Steel Joists, ordinary sections	6 0 0 ...	6 15 0
Compound Girders, ordinary sections	7 10 0 ...	8 10 0
Steel Compound Stancheons	9 2 6 ...	10 12 6
Angles, Tees and Channels, ordinary sections	7 10 0 ...	8 10 0
Flitch Plates	7 15 0 ...	8 5 0
Cast Iron Columns and Stanchions including ordinary patterns	6 12 6 ...	7 15 0

METALS.

	Per ton, in London. £ s. d.	£ s. d.
IRON— Common Bars	7 0 0 ...	7 10 0
Staffordshire Crown Bars, good merchant quality	7 10 0 ...	8 0 0
Staffordshire "Marked Bars"	9 10 0 ...	—
Mild Steel Bars	8 5 0 ...	8 15 0
Hoop Iron, basis price	8 15 0 ...	9 0 0
„ „ Galvanized	16 10 0 ...	—

(*And upwards, according to size and gauge.)

Sheet Iron, Black— Ordinary sizes to 20 g.	9 0 0 ...	—
„ „ 24 g.	10 0 0 ...	—
„ „ 26 g.	11 15 0 ...	—
Sheet Iron, Galvanised, flat, ordinary quality— Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g.	12 10 0 ...	—
Ordinary sizes to 22 g. and 24 g.	13 0 0 ...	—
„ „ 26 g.	14 0 0 ...	—
Sheet Iron, Galvanised, flat, best quality— Ordinary sizes to 20 g.	15 10 0 ...	—
„ „ 22 g. and 24 g.	16 0 0 ...	—
„ „ 26 g.	17 10 0 ...	—
Galvanised Corrugated Sheets— Ordinary sizes 6 ft. to 8 ft. 20 g.	12 10 0 ...	—
„ „ 22 g. and 24 g.	13 0 0 ...	—
„ „ 26 g.	13 15 0 ...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 0 0 ...	—
Best Soft Steel Sheets, 22 g. & 24 g.	12 0 0 ...	—
„ „ „ 26 g.	13 10 0 ...	—
Cut nails, 3 in. to 6 in.	9 0 0 ...	9 10 0

(Under 3 in., usual trade extras.)

LEAD, &c.

	Per ton, in London. £ s. d.	£ s. d.
LEAD—Sheet, English, 3lb. and up	16 0 0 ...	—
Pipe in coils	16 10 0 ...	—
Soil pipe	19 0 0 ...	—
Compo pipe	19 0 0 ...	—
ZINC—Sheet— Vieille Montagne ...ton	30 5 0 ...	—
Silesian	30 0 0 ...	—
COPPER— Strong Sheet...per lb.	0 0 10 ...	—
Thin „ „	0 0 11 ...	—
Copper nails „	0 0 10 ...	—
BRASS— Strong Sheet	0 0 9½ ...	—
Thin „ „	0 0 10 ...	—
TIN—English Ingots „	0 1 4½ ...	—
SOLDER—Plumbers' „	0 0 6½ ...	—
Tinmen's „	0 0 8 ...	—
Blowpipe „	0 0 9 ...	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2¾d.	per ft. delivered.
„ fourths	2d.	„ „
21 oz. thirds	3¾d.	„ „
„ fourths	3d.	„ „
26 oz. thirds	4¾d.	„ „
„ fourths	3¾d.	„ „
32 oz. thirds	5¾d.	„ „
„ fourths	5d.	„ „
Fluted Sheet, 15 oz.	3¾d.	„ „
„ 21 oz.	4¾d.	„ „
⅛ Hartley's Rolled Plate	2d.	„ „
⅛ „ „ „	2¾d.	„ „
¼ „ „ „	2¾d.	„ „

OILS, &c.		£ s. d.
Raw Linseed Oil in pipes	per gallon	0 1 6
,, ,, ,, in barrels	,,	0 1 10
,, ,, ,, in drums	,,	0 2 0
Boiled ,, ,, in pipes	,,	0 1 11
,, ,, ,, in barrels	,,	0 2 0
,, ,, ,, in drums	,,	0 2 2
Turpentine, in barrels	,,	0 3 9
,, in drums	,,	0 3 11
Genuine Ground English White Lead	per ton	19 15 0
Red Lead, Dry	,,	19 5 0
Best Linseed Oil Putty	per cwt.	0 6 6
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

PUBLISHER'S NOTICES.

Nat. Tel., 6112, Gerrard. Telegrams, "The Builder, London."

THE INDEX (with TITLE-PAGE) for VOLUME LXXXVIII. (January to June, 1905) is given as a supplement with the current issue.

CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each; also

READING CASES (Cloth), with Strings, price 9d. each.

THE EIGHTY-EIGHTH VOLUME of "The Builder" (bound), price Twelve Shillings and Sixpence, will be ready on the 20th inst.

SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 3s. 6d. each.

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, etc., etc.

Six lines or under ..... 6s. 0d.
Each additional line ..... 1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade advertisements, and for front page, and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

Four lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

*** Stamps *must not* be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine Street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE NOON on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, etc., left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS advertising in "THE BUILDER" may have *Replies addressed to the Office*, Catherine Street, Covent Garden, W.C., *free of charge*. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES { NINEPENCE EACH. By post (carefully packed) 1s.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ASHBY WOULDS.—For sewerage works, Albert Village, for Ashby Woulds Urban District Council. Messrs. H. Walker & Son, engineers, Albion-chambers, King-street, Nottingham. Quantities by engineer :—

H. Law	£1,400 0 0	J. Lottie	£1,173 11 0
Cope & Raynor	1,315 3 0	W. Moss	1,159 0 0
E. Orton	1,258 0 0	C. E. Cox & Co.	1,153 5 0
A. Jewell	1,253 13 0	W. J. Willmot	1,136 0 0
W. H. Maxey	1,240 0 0	H. Bennet	1,134 10 0
F. Mailand	1,218 4 10	G. Holloway	1,100 0 0
H. H. Barrey	1,205 14 0	H. Hashley	1,085 8 6
J. Walker & Son	1,195 0 0	J. J. Warner	1,077 0 0
J. H. Vickers	1,188 0 0	T. H. Harper, Calton*	996 0 0
E. Clarke	1,185 0 0		

ABINGDON. — For erecting a new ward block (sixteen beds), for the Joint Hospital Board. Mr. J. G. T. West, architect, The Knowl, Abingdon :—

G. King	£2,640 0 0	H. Willcock & Co.	£2,285 0 0
Benfield & Loxley	2,612 0 0	T. Williams	2,217 0 0
W. J. Drew	2,499 0 0	A. Cox	2,207 0 0
T. H. Kingerlee & Sons	2,467 0 0	A. J. Colbourne	2,182 6 10
J. Wooldridge	2,377 0 0	J. Buckle & Sons, Abingdon*	2,124 0 0
J. Smallbone	2,364 0 0		

BELPER.—For sewers and sewage-disposal works for the village section of South Wingfield, for the Rural District Council. Mr. R. C. Cordon, Engineer and Surveyor, Duffield, Derby :—

W. W. Bateman	£457 19 3	C. E. Cox & Co.	£422 0 0
Beighton & Berry	454 12 0	R. Holmes & Son	400 0 0
Harris Bros.	449 2 0	J. Walker & Sons	394 0 0
H. Ashley	445 15 10	J. & J. Warner, Mickleover, Derby*	355 3 0
G. Clarke & Sons	438 17 2		
Barker & Sons	431 13 6		
J. A. Meredith	430 0 0		

[Engineer's estimate, £405.]

BRENTFORD.—For laying 4,145 sq. yds. of creosoted firwood block paving, Half Acre and Boston-road, for the Urban District Council. Mr. Nowell Parr, Engineer and Surveyor, Clifden House, Boston-road, Brentford :—

	Per yd. super. s. d.		Per yd. super. s. d.
T. Watson, jun.	13 2	W. Griffiths & Co.	10 4
W. Neave & Sons	11 10	Acme Flooring Co.	9 3
A. Walker & Son	11 6	Improved Wood Pavement Co.	9 2
T. Cook Starkey	11 6	G. Wimpey & Co., Hammersmith*	8 9
J. Shelbourne & Co.	11 3		
J. Mowlem & Co.	10 11		

BRENTFORD.—For formation and paving of a footpath on the west side of Half Acre, for the Urban District Council. Mr. Nowell Parr, Engineer and Surveyor, Clifden House, Boston-road, Brentford :—

W. Neave & Sons	£296 0 0	Harvey Bros.	£233 17 0
J. Shelbourne & Co.	275 0 0	J. Mowlem & Co.	233 0 0
W. Griffiths & Co.	270 0 0	G. Wimpey & Co., Hammersmith*	230 0 0
T. Watson, jr.	240 10 0	Acme Flooring, etc., Co.	226 14 6

CHESTERGATE.—For erecting new schools, Hardman-street, for the Stockport Education Committee. Messrs. Cheers & Smith, architects, Blackburn and London. Quantities by architects :—

—	Keen's Cement Dadoes, etc. £ s. d.	Alternative Tender. Glazed Brick Dadoes, etc. £ s. d.
D. Mullaney	10,160 0 0	11,229 0 0
W. C. Broadhurst	10,285 15 0	11,423 7 4
W. B. Beattie	11,030 0 0	12,455 0 0
S. Smith	11,638 4 8	12,913 8 8
J. Broadhurst	10 895 0 0	12,220 0 0
J. Briggs	10,350 0 0	11,710 0 0
W. Pownall	10,498 14 11	11,681 14 6
S. Warburton	12,000 0 0	13,264 0 0
T. Pickles	13,031 7 3	14,404 1 9
J. Gerrard & Sons	11,220 0 0	12,183 0 0
F. & W. Meadows	10,895 0 0	12,095 0 0
Bowman & Sons	13,019 13 0	14,439 0 4
Robinson & Son	10,489 6 7	11,518 6 1
W. Hopkins	10 600 0 0	11,600 0 0
J. H. Wood	11,300 0 0	13,113 6 0

EBBW VALE.—For widening and improving the road from the Great Western Railway Bridge to the County School, for the Urban District Council. Mr. T. J. Thomas, Engineer and Surveyor, Ebbw Vale :—
W. Miles, Mount Pleasant-road, Ebbw Vale* .. £1,377

FARNHAM.—For almshouses, Farnham, for the Trustees of the late G. McDonald. Mr. A. J. Stedman, architect and surveyor, South-street-chambers, Farnham, Surrey :—

		Reduction if timber work in deal.
W. White	£3,914 8 6	£129 0 0
W. German	3,878 17 0	128 7 0
J. Appleby & Sons	3,659 0 0	90 0 0
Haslemere Builders, Ltd.	3,543 0 0	87 0 0
Higgs & Outhwaite	3,464 0 0	40 0 0
T. J. Hawkins & Co.	3,442 13 0	125 0 0
A. Chuter	3,321 0 0	156 15 0
Cæsar Bros.	3,310 0 0	50 0 0
F. Knight	3,290 0 0	120 0 0
Goddard & Sons	3,259 0 0	137 0 0
W. Watson	3,165 0 0	88 10 0
Lorden & Son	3,129 0 0	84 0 0
Crosby & Co.	3 154 0 0	105 0 0
F. Milton	3,116 0 0	75 0 0
W. J. Snuggs	3,106 0 0	65 0 0
Drowley & Co.	3,101 0 0	60 0 0
Kent & Hall	3,077 1 8	73 0 0
Tompsett & Co.	2,960 0 0	100 0 0
G. Kemp	2,929 0 0	75 0 0
Spear & King	2,920 0 0	94 0 0
E. C. Hughes	2,858 5 3	29 15 3
Martin, Wells, & Co.	2,791 0 0	81 0 0
A. G. Mardon	2,709 0 0	40 0 0

FAVERSHAM.—For taking up and relaying 976 super. yds. of wood block paving in West-street, for the Corporation. Mr. S. P. Andrews, Borough Surveyor, 20, West-street, Faversham :—

	Per yd. super. s. d.
Improved Wood Pavement Co.	3 11
Acme Flooring and Paving Co.	2 8
P. Smith	1 5
M. Chrisfield, Sittingbourne*	1 2

GLOUCESTER.—For erecting a model steam laundry, for the Gloucester Model Laundry Company, Ltd. Mr. J. Fletcher Trew, architect, County-chambers, Gloucester :—

Freeman & Jones.	£2,109	J. Byard & Son	£1,830
J. Gurney	2,020	T. J. Williams	1,777
W. T. Nicholls	1,999	J. Simmonds*	1,765
W. Jones, junr.	1,916		

[All of Gloucester.]

GUILDFORD.—For erecting brick and concrete piers to carry a girder bridge across the River Wey, at Newark, for the Rural District Council. Mr. J. Anstee, Engineer, District Council Offices, Commercial-road, Guildford. Quantities by Engineer :—

A. G. Osenton, Tilehurst near Reading* £459 5 9
[Thirty other tenders.]

GUILDFORD.—For iron and steel work for bridge across the River Wey at Newark, in the parish of Send and Ripley, for the Rural District Council. Mr. J. Anstee, Engineer, Council Offices, Commercial-road, Guildford. Quantities by Engineer :—

A. G. Osenton, Tilehurst, near Reading* £79
[Thirty other tenders.]

HOVE.—For erecting public elementary schools for about 600 children, in Portland-road, for the Education Committee. Messrs. Clayton & Black, architects, 10, Prince Albert-street, Brighton :—

H. J. Penfold	£7,867	H. A. C. Jay	£7,150
Longley & Co.	7,558	Rowland Bros.	7,059
Martin, Wells, & Co.	7,500	W. Brown & Sons	7,055
W. A. Field & Co.	7,435	J. & M. Patrick	6,969
Lynn & Sons	7,418	Hawkins & Co.	6,948
Cook & Sons	7,200	Hockley & Co.	6,864
Barnes & Sons	7,195	Norman & Burt, Burgess Hill*	6,551
Parsons & Sons	7,190		

HOYLAND NETHER.—For reconstruction and alteration of settling tanks at sewage farm, for the Urban District Council. Mr. H. G. Keywood, Engineer and Surveyor, Town Hall, Hoyland Nether, near Barnsley :—

W. Craig	£311 5 0	M. Hall	£226 12 2
A. Firth	307 16 6	Nadin & Darwent	222 0 0
W. Waring & Sons	293 11 0	R. Holmes & Sons	214 6 10
Jones Bros.	253 10 0	W. Johnson	204 19 0
Thorneycroft & Norman	235 15 0	M. Hague, Hoyland*	176 5 6
T. P. Hague	227 13 0		

[Engineer's estimate, £282 7s. 6d.]

KINNERSLEY.—For alterations and additions to Kinnersley Castle, Herefordshire. Messrs. Groome & Bettington, architects and surveyors, Palace-chambers, Hereford :—

First Contract.

W. Rowberry	£1,434 10	W. Bowers & Co.	£1,092 0
Beavan & Hodges	1,213 0	C. Cooke	1,076 0
R. Morgan	1,200 0	E. W. Wilks	1,031 0
W. P. Lewis & Co.	1,190 0	W. Powell, Hereford*	1,017 0
Davies & Co.	1,112 0	J. C. Vaughan	957 0

[In accepting Mr. Powell's Tender, the time of completing the work has been taken into consideration]

LEYTON.—For tar-paving the playgrounds of Norlington-road School, for the Urban District Council Education Committee. Mr. W. Jacques, architect, 2, Fen-court, Fenchurch-street, E.C. :—

I. Farthing	£600 0 0	Wainwright & Co., Ltd.	£484 0 0
Goddard & Co.	570 0 0	F. G. Sheppard (Sheppard & Co.)	482 6 4
D. Dowley, Ltd.	536 5 3	W. Manders, Leyton*	476 16 6
J. Smart & Son	530 0 0	Chittenden & Simmons	473 10 0
Cheshire Asphalte Co.	505 8 6		
Constable, Hart, & Co., Ltd.	487 16 3		

LONDON.—For painting and other works at the Infirmary, Harrow-road, for the Paddington Guardians. Mr. E. Howley Sim, architect, 8, Craig's-court, Charing Cross, W.C. :—

Painting and General Repairs.

G. F. Vigor & Co.	£1,160 0 0	Flower Bros., 48, Upper Baker-st., N.W.*	£756 11 0
T. Pearce	1,105 0 0	Woollaston Bros.	740 0 0
G. Foxley	936 0 0	F. R. Biggs & Co.	685 15 5
W. J. Fryer & Co.	870 0 0		
R. Iles, Ltd.	770 0 0		
F. Chidley & Co., Ltd.	768 4 0		

Repair of the Electric Bells and Fire-Alarms at the Infirmary.

Tamplin & Makowski, Ltd.	£250 0 0
London and Provincial Telephone and Fittings Co.	199 5 2
Donnison, Sillem, & Co.	184 0 0
W. J. Bishop & Co.	179 14 0
Beam Co.	179 0 0
Walsall Electrical Co., Ltd.	143 19 10
W. Winn	120 0 0
F. W. Brock	115 13 0
Comyn, Ching, & Co., Ltd.	109 0 0
Jackson Bros.	102 5 0
F. J. Coleby & Co.	98 15 0
W. J. Fryer & Co.	97 0 0
Private Wire and Telephone Installation Co., Ltd.	91 15 0
Western Engineering Co.	89 15 0
G. & H. Turner	78 6 0
R. H & J. Pearson, Ltd., 141, High-street, Notting Hill-gate, W.*	75 0 0
Telephone and Electrical Installation Co.	75 0 0
Holmes & Cooper	71 5 0
J. Bryden & Sons	66 0 0
Electrical Engineering and Maintenance Co.	49 0 0

TENDERS.—*Continued on page* 55.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

(For some Contracts, etc., still open, but not included in this List, see previous issues.)

COMPETITIONS.

Nature of Work.	By whom Required.	Premiums.	Designs to be Delivered
*Public Library	Cheshunt U.D.C.	Not stated	Sept. 23

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, etc., supplied by	Tenders to be Delivered
Underground Mains	Wishaw Electricity Committee	E. F. Cox, Engineer, 10, Russell-street, Wishaw, N.B.	July 11
Excavating, Temporary and Permanent Reinstating	do.	do.	do.
Street Arc Lamps	do.	do.	do.
Tar Paving	Bromley Town Council	F. H. Norman, Town Clerk, Municipal Offices, Bromley, Kent	do.
New Lavatory, etc., at Workhouse, Torpoint	St. Germans Guardians	F. E. Cleverton, Clerk, 4, Buckland-terrace, Plymouth	do.
Paving Coppenhall-terrace, etc.	Crewe Town Council	G. Eaton-Shore, Borough Surveyor, Heath-street, Crewe	do.
Road Works, Newton-street, etc	do.	do.	do.
Fireclay Pipes	Edinburgh & District Water Trustees	W. A. Tait, C.E., 72A, George-street, Edinburgh	do.
Hatch Boxes and Expansion Joints	do.	do.	do.
500 tons of Drysand Cast-Iron Pipes	do.	do.	do.
Sewage Pumping Station, Holdford-road, Witton	Handsworth U.D.C.	H. Richardson, Engr. & Sur., Council Ho., Handsworth, Birmingham	do.
Ten Two-wheeled Dust Carts	Rathmines U.D.C.	F. P. Fawcett, Clerk, Town Hall, Rathmines	do.
Repaving, etc., Bolton to Manchester-road, Clifton	Lancashire C.C.	W. H. Schofield, County Surveyor, County Offices, Preston	do.
Private Improvement Works	Bootle Corporation	J. H. Farmer, Town Clerk, Bootle	do.
Foreman's House at Falmer Pumping Station	Brighton Corporation	H. Talbot, Town Clerk, Town Hall, Brighton	do.
Soft Wood Paving, Part of Albion-road	Stoke Newington Borough Council	W. F. Loveday, Boro. Surv., Town Hall, Milton-rd., Stoke Newington	do.
Unclimbable Iron Fencing round Reservoir No. 2	Cowes U.D.C.	J. W. Webster, Surveyor, High-street, Cowes, I.W.	do.
Children's Clearing-house, Workhse., Rice-la., Walton	West Derby Guardians	H. P. Cleaver Broughton-terrace, West Derby-road, Liverpool	July 12
Drainage Work Repairs, Public Hall, Slough	The Trustees	G. Young, Secretary, Public Hall, Slough	do.
Baptist Chapel at Llanhilleth		W. Beddoe Rees, Architect, 3, Dumfries-place, Cardiff	do.
Repairs, Painting, etc., at Attercliffe Police-Station	Sheffield Watch Committee	C. F. Wike, City Surveyor, Town Hall, Sheffield	do.
Repairs, Painting, etc, Mortuary, Plum-la., Sheffield	do.	do.	do.
Forty Houses near Tylers Arms, Blaina, Mon.	Blaina Building Club	W. Thomas, Architect, Nantyglo, Mon.	do.
Nurses' Home, Bangour Village	Edinburgh District Lunacy Board	H. J. Blanc, R.S.A., Architect, 25, Rutland-square, Edinburgh	do.
Cleaning, Distempering, and Painting at Town Hall	Twickenham U.D.C.	F. W. Pearce, Surveyor, Town Hall, Twickenham	do.
Heating and Ventilation at Town Hall	do.	do.	do.
Removing and Re-fixing Wind Engine and Pump	Wilby Parish Council	B. Thompson, 67, Victoria-road, Northampton	do.
Small Engine House	do.	do.	do.
Oil Engine and Pump	do.	do.	do.
Addit. Rooms, Port Talbot Central Council School	Glamorgan C.C.	T. M Franklen, Clerk, C.C. Offices, Westgate-street, Cardiff	do.
Repairs, etc., at Pontardawe Council School	do.	do.	do.
Alterations to Aberavon Council School	do.	do.	do.
Drainage, Water Supply, etc., Velindre Council Sch.	do.	do.	do.
Painting, etc., at Council Schools	do.	do.	do.
Extend. Artificial Stonemaking Shed, Molesworth-st.	Lewisham Borough Council	Surveyor's Department, Town Hall, Catford	do.
Guernsey Granite	Elham R.D.C.	A. Hambrook Surveyor, Lyminge, Kent	do.
Alterations, etc., D vel. House, Maxwell-la., Fochabers		A. Gordon, Rowan Cottage, Fochabers	do.
Repairing Set of Stone Steps leading to Lecture Hall	Central Finsbury Radical Club	The Secretary, 326, City-road, E.C.	July 13
Improvement of Tynycae-place, Penygraig	Rhondda U.D.C.	W. J. Jones, Engineer, Public Offices, Pentre, Rhondda	do.
Alterations, etc., to Workhouse Laundry, Cuckfield	The Guardians	E. Waugh, Clerk, Boltro-road, Haywards Heath	do.
Road Works, Fleur-de-Lis	Jones & Warne	C. T. Evans, Architect, 8, Queen-street, Cardiff	do.
Cast-Iron Pipes, Dewsbury-road Pipe Line	Leeds Corporation	C. G. Henzell, Waterworks Engineer, Municipal-buildings, Leeds	do.
*Road Improvements, Potters Bar	South Mimms R.D.C.	W. H. Mansbridge, 40, High-street, Barnet	do.
Additions, etc., at Ancrum-road Public School	Dundee School Board	J. H. Langland, Architect, 31, Murraygate, Dundee	July 14
Public Convenience at Dundee-street	Edinburgh City Council	Burgh Engineer	do.
Whitewash., etc., Union Infirmary, Hope, nr. Eccles	Salford Guardians	Steward of the Infirmary	do.
*Alterations and Additions to Schools	Surrey Education Committee	Jarvis & Richards, 36, Victoria-street, S.W.	do.
*Wood Paving Works	Paddington Borough Council	Borough Surveyor, Town Hall, Paddington, W.	July 15
Sewerage and Sewage Disposal at Prospect	Cockermouth R.D.C.	J. B. Wilson, Engineer, 11, Main-street, Cockermouth	do.
Stores	Heywood & Middleton Water Board	J. Diggle, Water Engineer, Water Board Offices, Heywood	do.
New Streets and Drains, etc., Highroad Well		M. Hall, Surveyor, Harrison-road, Halifax	July 17
*Additions, etc., to Basement of Public Library	Chelsea Public Libraries Committee	Public Library, Manresa-road, Chelsea, S.W.	do.
Painting, Colouring, etc., Schools	Bristol Education Committee	P. Addie, City Valuer's Office, Council House, Bristol	do.
Electric Lighting	Neath R.D.C.	D. M. Davies, Engineer, Neath	do.
Library, King's Norton	King's Norton & Northfield U.D.C.	A. W. Cross, Engineer, 23, Valentine-road, King's Heath	do.
Partial Rebuilding Waunfawr School, Cross Keys	Monmouthshire Education Com.	R. L. Roberts, Architect, Abercarn, Mon.	do.
Four Shops, Great Clowes-street, Higher Broughton		E. Woodhouse, Architect, 88, Mosley-street, Manchester	do.
Eight Dwellings, Meadow-terrace, Treforest		A. Lloyd Thomas, Engr. and Arch., Church-st.-chbrs., Pontypridd	do.
Repairs of Bow Bridge, Wateringbury	Maidstone R.D.C.	C. Warne, Surveyor, Barming	do.
Granite Concrete Coping to Settling Tanks	Eccles Corporation	G. W. Willis, Sewage Works, Peel Green-road, Patricroft	do.
Furniture, Moxley Hospital, Bilston	S. Staffordshe. Smallpox Hos. Board	Engineer's Office, Town Hall, Wolverhampton	July 18
Hand Laundry Machinery	do.	do.	do.
Disinfector	do.	do.	do.
Iron and Barbed-wire Fencing	do.	do.	do.
Making-up Road, Long-street, East Barnet	East Barnet Valley U.D.C.	H. York, Surveyor, Station-road, New Barnet	do.
Tar-Paving Footways	do.	do.	do.
Sixteen Double-Centre Ward Stoves for Infirmary	Stourbridge Guardians	G. F. James, Clerk, 12, Hagley-road, Stourbridge	do.
Electric Lighting Workhouse Buildings	do.	do.	do.
Gas Pipes and Fittings	do.	do.	do.
Lamp Pillars, Irons, Carriages, etc., & Glass for Lamps	Leeds Street Lighting Committee	Superint. of Street Lighting, Springwell-st., Whitehall-rd., Leeds	do.
Painting, etc., Schools	Leeds Education Committee	W. Packer, Secretary, Education Offices, Leeds	do.
*New Entrances, etc., St. Geo.-the-M. Ch., Southwark	London C.C.	Superintending Architect's Department, 15, Pall Mall East, S.W.	do.
*Erection of Houses at Uxbridge	Great Western Railway Co.	Office of the Engineer, Paddington Station, W.	do.
*Broken Blue Guernsey Granite	Brentford U.D.C.	Council's Surveyor, Clifden House, Boston-road, Brentford	do.
Sewer, from Middleton to Slattocks and Stakehill	Middleton Corporation	W. Welburn, Borough Surveyor, Middleton	July 19
Sewerage and Sewage Disposal, Brewood	Cannock R.D.C.	H. M. Whitehead, Engineer, Penkridge	do.
Linton Sewerage (Contract No. 1)	Ripton R.D.C.	Wilcox & Raikes, Engineers, 63, Temple-row, Birmingham	do.
*Extensions to Arthur-road Schools, Beckenham	Beckenham U.D.C.	J. A. Angell, Architect, Council Offices, Beckenham	do.
*Boundary Fencing at Asylum	Newport C.B. Lunacy Committee	Borough Engineer, Town Hall, Newport	do.
*Painting of Schools, Norwood	Lambeth Guardians	Guardians' Offices, Brook-street, Kennington-road, S.E.	do.
Stores	Cavan & Leitrim Railway Co., Ltd.	R. R. Stewart, Secretary, 37, College-green, Dublin	July 20
Cast-Iron Manhole Covers	Receiver-Gen. & Direc. of Contracts	W. Casolani, Valletta	July 21
Cast-Iron Pipes and Irregular Castings	do.	do.	do.
Burn Sewer Outlet Extension	West Hartlepool Corporation	Nelson F. Dennis, Boro. Engr., Municipal-bldgs., West Hartlepool	do.
Permanent Way, Service Line to Car Sheds, Dean-rd.	South Shields Corporation	S. E. Burgess, Borough Engineer, Chapter-row, South Shields	July 22
Annual Contracts	Conway Borough Council	Borough Surveyor, Town Hall, Conway	do.
Private Street Works	Levenshulme U.D.C.	J. Jepson, Surveyer, Guardian-chambers, Tiviot Dale, Stockport	do.
Bakery in Weaver-streeet, Winsford	Industrial Co-operative Society, Ltd.	W. Fryer, 21, High-street, Winsford	do.
*Depot Buildings in Croydon-road	Penge U.D.C.	Council's Surveyor, Town Hall, Anerley, S.E.	do.
Conversion of St. Peter's Sch. into Council Sch. for 260	Hereford Education Authority	J. Parker, City Surveyor, Town Hall, Hereford	July 24
*New School at Brookwood	Surrey Education Committee	Jarvis & Richards, 36, Victoria-street, Westminster, S.W.	do.
*Extension of Electric Light Works	Beckenham U.D.C.	Council's Surveyor, Beckenham	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, etc., supplied by	Tenders to be Delivered
*Tramway Offices and Car Depot, Plaistow	West Ham Borough Council	Borough Engineer, Town Hall, West Ham	July 25
*Block of Dwellings. New King's-road, Fulham	London C.C.	Housing Section, Arch. Depart., 19, Charing Cross-road, W.C.	do.
*Portion of Block of Dwellings, Stepney	do.	do.	do.
Electric Locomotives, Traction Mains, etc.	Dublin Corporation	Spencer Harty, City Engineer, City Hall, Dublin	do.
*Cast-Iron Storage Tanks, etc., at Darenth Asy., Kent	Metropolitan Asylums Board	Office of the Board, Embankment, E.C.	do.
*Making Roads, Laying Tram. Lines, etc., Carshalton	do.	Architect's Office, 29A, Charing Cross-road, W.C.	July 26
Extension of Municipal Buildings, High-street	Burntisland Town Council	Burgh Surveyor, Town Hall, Burntisland, N.B.	do.
Pipe-Laying, Springfield and Great Baddow	Chelmsford R.D.C.	J. Dewhirst, Engineer, Avenue-chambers, Chelmsford	July 28
*Steelwork, etc., for New Public Hall, Hull	Hull Corporation	City Architect, Town Hall, Hull	do.
Central Premises, Widnes	Runcorn & Widnes Indus. Co-op. Soc.	4 and 6, Church-street, Runcorn	July 29
*New Grammar School, Lincoln	The Governors	Leonard Stokes, Architect, 2, Great Smith-street, S.W.	do.
Culvert, 180 yds. long, at Lydbrook School	Gloucestershire Education Com.	M. H. Medland, County Architect, 15, Clarence-street, Gloucester	do.
*Extension of Mile End Public Library	Stepney Borough Council	Borough Engineer, 15, Great Alie-street, E.	July 31
Plotting Scales (Boxwood and Ivory)	Director-General Ordnance Survey	Officer in Charge of Stores, Ordnance Survey Office, Southampton	Aug. 1
1,800 lineal yds. of 4 ft. 9 in. diam. Circular Sewer, etc.	Cardiff Corporation	W. Harpur, Borough Engineer, Cardiff	Aug. 2
2,940 lineal yds. of 4 ft. 9 in. diam. Circular Sewer, etc.	do.	do.	do.
1,050 lineal yds. of 4 ft. 9 in. diameter Sewer	do.	do.	do.
Refuse Destructor Plant	Merthyr Tydfil U.D.C.	F. Fletcher Harvey, Engineer & Sur., Town Hall, Merthyr Tydfil	Sept. 1
Sinking Shaft at Bryn Navigation Colliery	.....	The Colliery, Bryn, Port Talbot Railway	No date
Cleaning & Decorating, St. John's Church, Pemberton	.....	J. Baynes, Fernleigh, Pemberton, Wigan	do.
*Temporary Iron School	Stockport Borough Council	A. Lawton, St. Petersgate, Stockport	do.
*Alterations and Additions to County Hall, Ipswich	East Suffolk C.C.	County Surveyor, 16, Museum-street, Ipswich	do.
Sinking a Shaft, 380 yds. deep, Elsecar, near Barnsley	.....	T. Newbould (Earl Fitzwilliams' Colliery)	do.
Alters., etc., St. Werburgh's Schools, Queen-st., Chester	.....	E. Kirby, Architect, 5, Cook-street, Liverpool	do.
Permanent Way and Bonding (Tramways, Contract 1)	Erdington U.D.C.	H. H. Humphries, Engineer, Public Hall, Erdington	do.
Additions to House in Roundhay-road, Leeds	Dr. Salkeld	J. M. Bottomley, Son, & Wellburn, Architects, 13, Bond-st., Leeds	do.
Electric Light, Kilkenny	Kilkenny Corporation	R. J. Gore, C.E., Town Hall, Kilkenny	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in
*Temporary Clerk (Borough Engineer's Department)	Woolwich Borough Council	2*l.* per week	July 17
*Temporary Architectural Assistant	Fulham Borough Council	3*l.* 3*s.* per week	No date.
*Assistant Instructor in Building Construction	Willesden Polytechnic	7*s.* 6*d.* per evening	do.
*Instructor in Elementary Technical Drawing	do.	7*s.* per evening	do.

Those marked with an asterisk (*) are advertised in this number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. *Public Appointments*, xviii.

TENDERS.—*Continued from page 53.*

LONDON.—For additions, alterations, and redecoration of the Murphy Memorial Hall, New Kent-road. Mr. A. Conder, architect, Palace-chambers, 9, Bridge-street, Westminster. Quantities by Mr. C. E. Blomfield, 40, Finsbury-square, London, E.C.:—

Hudson Bros.	£7,250	Holloway Bros.	£6,616
Staines & Son	6,960	W. Akers & Co.	6,594
J. Chapman	6,936	F. & H. F. Higgs	6,580
Stimpson & Co.	6,930	J. Smith & Sons	6,535
J. Grover & Son	6,882	L. H. & R. Roberts	6,420
Kirk & Randall	6,672	H. Young	6,316

LONDON.—For electric light installations, South Battersea station and Westminster (new) station, for the London County Council:—

South Battersea Station.

Tamplin & Makovski, Ltd.	£251 0 0	F. J. Coleby & Co.	£182 10 0
O. Clark & Co.	199 17 6	R. Dawson, Ltd.	182 0 0
W. H. Johnson	195 0 0	A. H. Marshall, 270, High-rd., Leytonstone*	155 10 0
Durell & Co.	189 15 0		
Barlow & Young	185 0 0		

Westminster Station.

Tamplin & Makovski, Ltd.	£326 0	R. Dawson, Ltd.	£249 0
O. Clark & Co.	290 19	F. J. Coleby & Co.	235 0
W. H. Johnson	274 0	A. H. Marshall, 270, High-road, Leytonstone*	196 10
Durell & Co.	266 11		
Barlow & Young	260 0		

LONDON.—For improvements to School, South Lambeth-road, Kennington, for Board of Education:—[Preliminary plans of a scheme of improvements have been prepared and approved by the Board of Education as follows: Providing a hall about 51 ft. by 28 ft. for each department; new classroom for each department (boys, 48; girls, 48; infants, 56); two new staircases and entrances for boys' and girls' departments, and two new entrances for infants' department; lavatory for boys' department; cloakrooms, teachers' and head teachers' rooms, and stockrooms for each department; rediviling, restepping, etc., certain classrooms in all departments; rebuilding boys' and girls' offices, and division wall between the playgrounds; and forming a new heating chamber and coal cellars in basement. Heating by low-pressure hot-water apparatus. The revised accommodation, on the completion of the improvements will be: Boys, 372; girls, 356; infants, 390; total, 1,118; being a net loss of 54 places.]

J. Grover & Son,	£15,984	Lawrance & Son.	£14,404
W. Downs	15,944	Treasure & Son	14,383
F. & H. Higgs	15,882	J. & M. Patrick	14,270
Patman & Fotheringham, Ltd.	15,723	W. Johnson & Co., Ltd.	14,151
Lathey Bros.	15,483	J. Appleby & Sons	14,089
Killby & Gayford.	15,359	W. Smith & Son.	14,088
Clarke & Bracey.	15,118	J. Marsland & Sons	13,855
J. Greenwood, Ltd.	14,959	J. Garrett & Son.	13,773
W. King & Son	14,773	E. Triggs, 92, The Chase, Clapham*	13,386
J. & C. Bowyer	14,587		
H. L. Holloway	14,546		

[The estimate of the architect (Education) for the work amounts to £14,284.]

LONDON.—For repairs to the Southwark station of the London Salvage Corps. Mr. Arthur F. Briggs, architect, 9, Queen Victoria-street, E.C.:—

Mansfield & Son	£955	Trollope & Sons and Colls & Sons	£840
Falkner & Sons	883	W. Heath*	780
Ashby & Horner	841		

LONDON.—For works to the operating-room at the District Sick Asylum, Devon's-road, Bromley, E., for the Managers of Poplar and Stepney Sick Asylum District. Messrs. J. & W. Clarkson, architects, 136, High-street, Poplar, E. Quantities by architect:—F. & T. Thorne, Manchester-road, Cubitt Town £420

LEYTON.—For cleansing, painting, repairs, and improvements to schools, for the Education Committee of the Urban District Council. Mr. W. Jacques, architect, 2, Fen-court, Fenchurch-street, E.C.:—

—	Cleansing, etc., Davies-lane. Exterior.	Cleansing, etc., Mayville-road. Exterior.	Cleansing, etc., Kirkdale-road. Interior.	Improvements Newport-road School.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
R. Athey	176 10 6	183 17 6	253 1 6*	—
Biggs & Co.	150 15 1	175 17 5	255 19 5½	—
H. Bouneau	198 0 0	190 0 0	530 0 0	—
H. R. Brown	210 0 0	168 0 0	406 0 0	—
A. E. Clark	—	209 0 0	295 0 0	—
F. J. Coxhead	192 0 0	205 0 0	529 0 0	93 0 0
A. G. Crisp	214 0 0	238 0 0	—	119 0 0
Scott Fenn	268 18 0	254 15 0	379 0 0	—
Franks & Simons	169 10 0	184 10 0	525 0 0	—
Gibbings & Co.	204 1 3	180 17 7	417 7 3	—
Gregar & Son	275 0 0	187 0 0	397 0 0	117 0 0
H. C. Horswill	—	—	—	99 0 0
J. T. Luton	199 0 0	163 0 0	—	67 0 0*
W. J. Maddison	289 0 0	204 0 0	415 0 0	135 0 0
W. Manders	201 12 6	150 3 6*	335 18 6	—
J. J. Quarterman	140 0 0*	150 0 0	360 0 0	—
Simmons & Co.	—	—	—	—
W. H. Swann	178 0 0	157 0 0	310 0 0	—
Vigor & Co.	195 0 0	210 0 0	330 0 0	—
H. Wilson	—	—	442 5 0	99 3 0
Woollaston Bros.	150 0 0	155 0 0	327 0 0	140 0 0

LONDON.—For making-up the carriageways of Inglethorpe-street and Parfrey-street, Fulham, for the Borough Council. Mr. F. Wood, Borough Surveyor, Town Hall, Fulham, S.W.:—

—	Inglethorpe-street.		Parfrey-street.	
	Roadway.	Footway.	Roadway.	Footway.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
H. J. Greenham	619 0 0*	—	649 0 0*	—
Harvey Brothers	629 17 0	341 0 0	696 13 7	356 2 6
		Alternative—		Alternative—
		201 9 11		201 16 2
		232 6 3		241 5 7
		201 9 11		210 7 10
		168 15 6		176 5 3
J. Mears	632 0 0	—	657 0 0	—
F. Fowles	645 0 0	—	680 0 0	—
G. Wimpey	646 0 0	—	654 0 0	—
A. B. Champniss	650 0 0	—	730 0 0	—
W. Neave & Son	774 0 0	—	821 0 0	—
Borough Surveyor	—	212 0 0*	—	215 0 0*

LONDON.—For alterations to No. 34, Queen-street, E.C., for the London Salvage Corps. Mr. Arthur F. Briggs, architect, 9, Queen Victoria-street, E.C.:—
Mansfield & Son .... £375 | W. Heath* £366

MULLINGAR.—For additions to Dysart Church for the Rev. C. Casey, P.P. Mr. W. A. Scott, architect, 74, Hollybank-road, Drumcondra, Dublin:—
C. Doyle ..... £960 | M. Lynam, Milltown
P. Hanway ..... 735 | Pass* £733

PENMACHNO.—For waterworks at Penmachno, for the Geirionydd Rural District Council. Mr. J. Hughes, Borough Surveyor, Ruthin:—

J. H. Roberts ..	£1,678 0	Hughes & Rowlands	£1,100 0
G. Roberts & Bros.	1,547 0	H. Roberts	1,060 0
R. Griffith & D. Jones	1,470 15	F. Mitchell & Son, Riverplace, City-road, Hulme, Manchester*	880 0
T. T. Williams & M. Jones..	1,228 0		
G. Reed & Son..	1,205 0		
Sheffield & Evans	1,140 0		

PORTSMOUTH.—For the erection of the Copnor-road Council School. Portsmouth, for the Portsmouth Education Committee. Mr. G. C. Vernon-Inkpen, architect and surveyor, 40, Commercial-road, Portsmouth:—

Armitage & Hodgson	£20,677 10 2	Clarke & Son	£19,103 0 0
Dowdell ..	20,661 14 4	Coltherup..	18,823 6 9
Kirk & Randall..	22,618 0 0	Corke	18,591 18 10
Light & Son	20,600 0 0	Davis	18,500 0 0
Cook & Sons	20,315 0 0	Learmouth	18,494 3 7
W. Ward ..	20,117 0 0	Harding ..	18,443 13 0
Perkins & Durrant.	19,590 8 0	Privett	18,365 0 0
W. W. Evans	19,375 0 0	Crockerell, Portsmouth*..	18,127 5 6

PORTSMOUTH.—For enlargement of building in constructing new dining-rooms, dormitories, hall, etc., for the Committee of the Royal Sailors' Home. Mr. G. C. Vernon-Inkpen, architect, 40, Commercial-road, Portsmouth:—

Kirk & Randall..	£11,220	Croad	£10,112
Corke	11,000	Privett	10,098
Clarke & Son	10,908	Spriggings	10,020
Evans	10,800	Perkins & Durrant	9,997
Harding	10,715	Salter	9,891
Light & Son	10,300	Coltherup	9,890
Dash	10,298	Dugan, Portsmouth*	9,687
Munday	10,238		
Crockerell	10,236		

PRESTON.—For road works back roads between Cheviot-street and West Strand, and Osborne-street and Hartington-road, for the Corporation. Mr. J. H. Smethurst, Acting Borough Surveyor:—
Back Road, Osborne-street and Hartington-road.
Chadwick Bros., Preston £147 3 10
Back Road, Cheviot-street and West Strand.
Chadwick Bros., Preston £161 17 6

ROTHBURY.—For water supply to new workhouse, for the Guardians. Mr. A. Snaith, engineer:—
R. Wood, M.E. £625 3 6 | J. Lee..... £239 15 0

SOUTH EALING.—For erecting a mission hall. Mr. W. A. Pite, architect, 116, Jermyn-street, St. James's. Quantities by Mr. W. J. Falkner, 19-23, Ludgate-hill, E.C.:—

Chambers Bros. ..	£2,230	J. Dorey & Co. ..	£2 047
Myring & Son	2,229	L. Whitehead & Co.	2,030
Garrett & Son	2,214	J. Appleby & Sons	2,020
W. Blackburn	2,200	W. J. Dickens	1,990
Barrett & Power ..	2,163	F. J. Messom & Sons	1,975
R. H. & R. Roberts	2,079	H. Flint, High Wycombe*	1,917
Chinchen & Co. ..	2,077		

SPENNYMOOR.—For making-up Works-road, for the Urban District Council:—
Section I.—Barnfield-road to Weardale-street.

W. Inglett	£609 2	J. Carrick	£526 0
G. H. Bell	564 17	G. Pickering	510 0
W. Burdon.....	536 0		

Section II.—Weardale-street to Green-lane.

W. Inglett	£686 17	G. H. Bell	£511 7
W. Burdon.....	588 5	J. Carrick	433 0
G. Pickering	530 0		

TEWKESBURY.—For constructing two concrete filter beds at the waterworks pumping station, for the Corporation of Cheltenham. Mr. J. S. Pickering, Borough Engineer, Municipal Offices, Cheltenham:—

Cruwys & Hobrough..	£2,895 18 6	M. Williams & Co.	£2,386 16 4
H. Page	2,571 18 7	Collins & Godfrey, Cheltenham* ..	2,359 9 7
A. J. Colborne	2,486 4 9		

TEIGNMOUTH.—For erecting an isolation hospital, mortuary, laundry, administrative block, etc., on the Bitton E-tate, for the Urban District Council. Mr. C. F. Gettings, Surveyor, Town Hall, Teignmouth:—

Bird & Pippard	£3,240 0 0	G. Lee	£2,896 0 9
R. F. Yeo & Son.....	3,161 15 9	F. C. Francis	2,896 15 4
F. J. Badcock	3,059 3 6	A. N. Coles .	2,862 17 6
W. E. Bennett	2,991 2 10	W. E. Blake	2,830 0 0
R. Wilkins & Sons	2,978 0 0	E. Andrews	2,761 9 9
W. T. Stevenson	2,950 0 0	T. J. Stanbury	2,761 0 0
S. Roberts..	2,929 6 4	Pethick Bros.	2,744 0 0
		G. H. Marshall, Birmingham*	2,584 0 6

TODMORDEN.—For main sewerage works, Halifax-road sewer, for the Health Committee. Mr. J. A. Heap, Borough Engineer, Todmorden. Quantities by Borough Engineer:—
H. E. Buckley, Bingley* £3,987 5 3

TUNBRIDGE WELLS.—For country cottage at Hartfield, for Mr. W. Wooding Starmer. Mr. W. Kirk, architect, Withyham, Tunbridge Wells:—
J. Jarvis & Son .. £1,049 | Soner & Jones, Tunbridge Wells* .. £1,000
J. Luxford 1,036

WESTCLIFF-ON-SEA.—For erecting a temporary church:—

Fenn & Co.‡	£690 / 670	W. Harbrow‡.....	£508 / 364
Humphreys, Ltd. ..	530	Darlington Construction Co.	340
H. Mortimer	480	E. Crossley.....	335
F. Smith & Co.	475	Ginger, Lee, & Co...	325
Bruce and Steel, Ltd.	402	Artistic Construction Co.‡	500 / 200
Alnwick Foundry & Engineering Co...	395		

‡ These prices include communion table, pulpit, reading desk, and seats.

WOODHALL SPA.—For constructing septic tanks, bacterial beds, filters, etc., for the Urban District Council. Mr. R. A. Macbrair, M.Inst.C.E., and Mr. E. E. T. Bolton, C.E., Council Offices, Woodhall Spa:—

B. Crookes ..	£2,567 9 7	J. H. Vickers	£2,229 18 6
S. S. Holdsworth	2,434 14 0	Kettering Co-Operative Builders, Ltd.	2,170 0 0
Oak Building Co.	2,366 12 6	H. H Barry, Radcliffe-on-Trent*	2,068 0 0
Jenkins & Son	2,316 8 1	T. H. Harper	2,000 0 0
W. Wright & Son	2,292 11 0		
S. M. Harrison	2,273 5 0		

[Engineer's estimate, £2,330 0s. 6d.]

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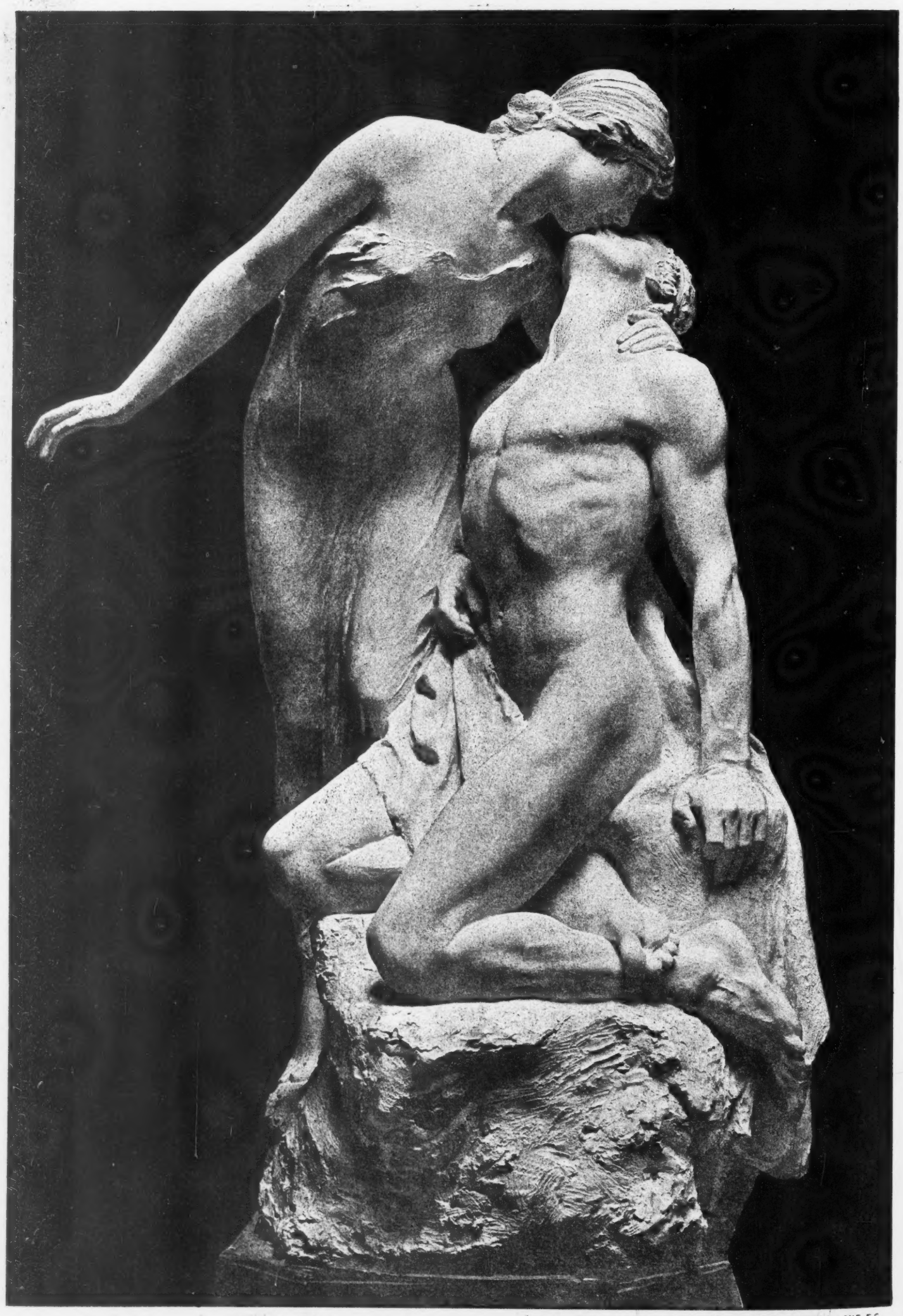

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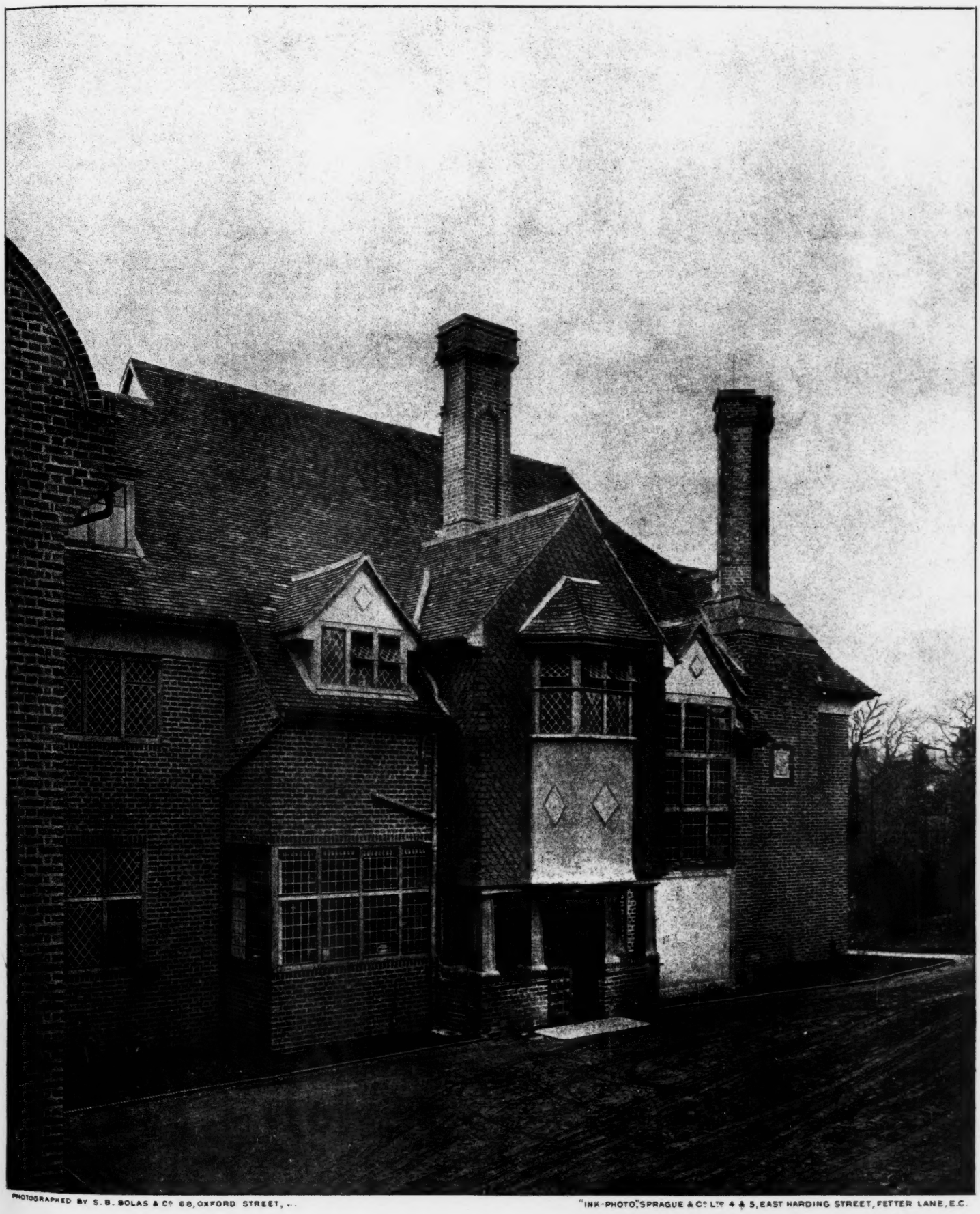

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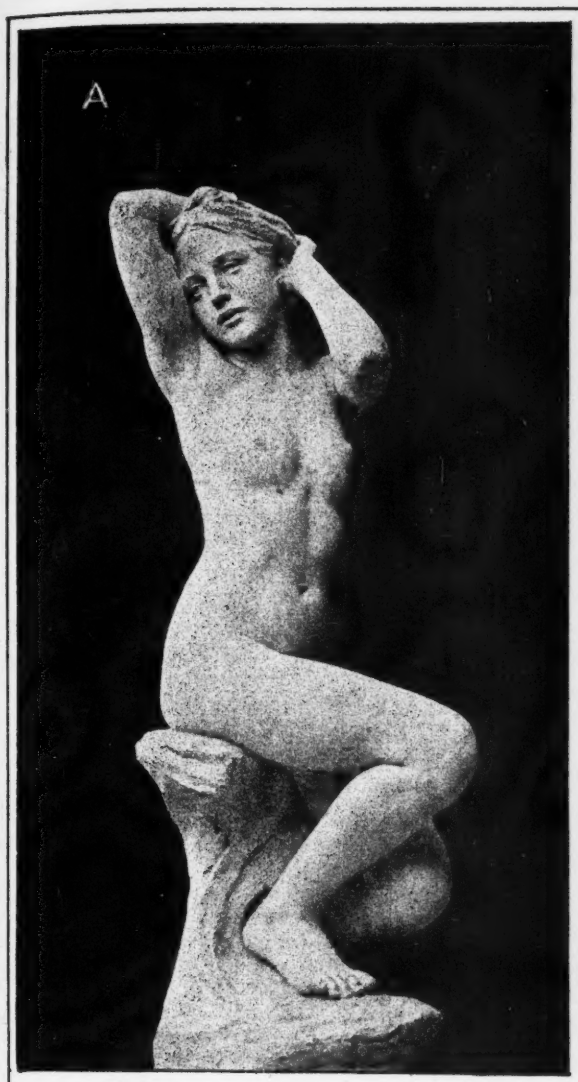

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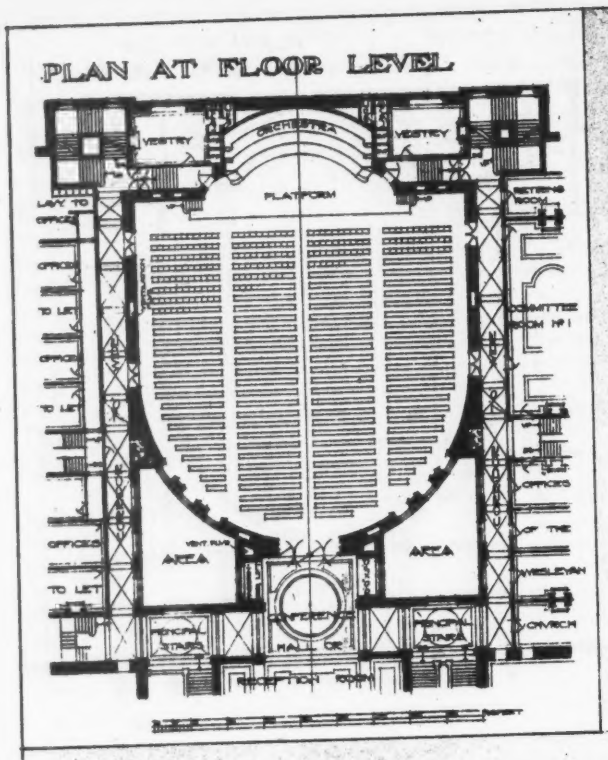

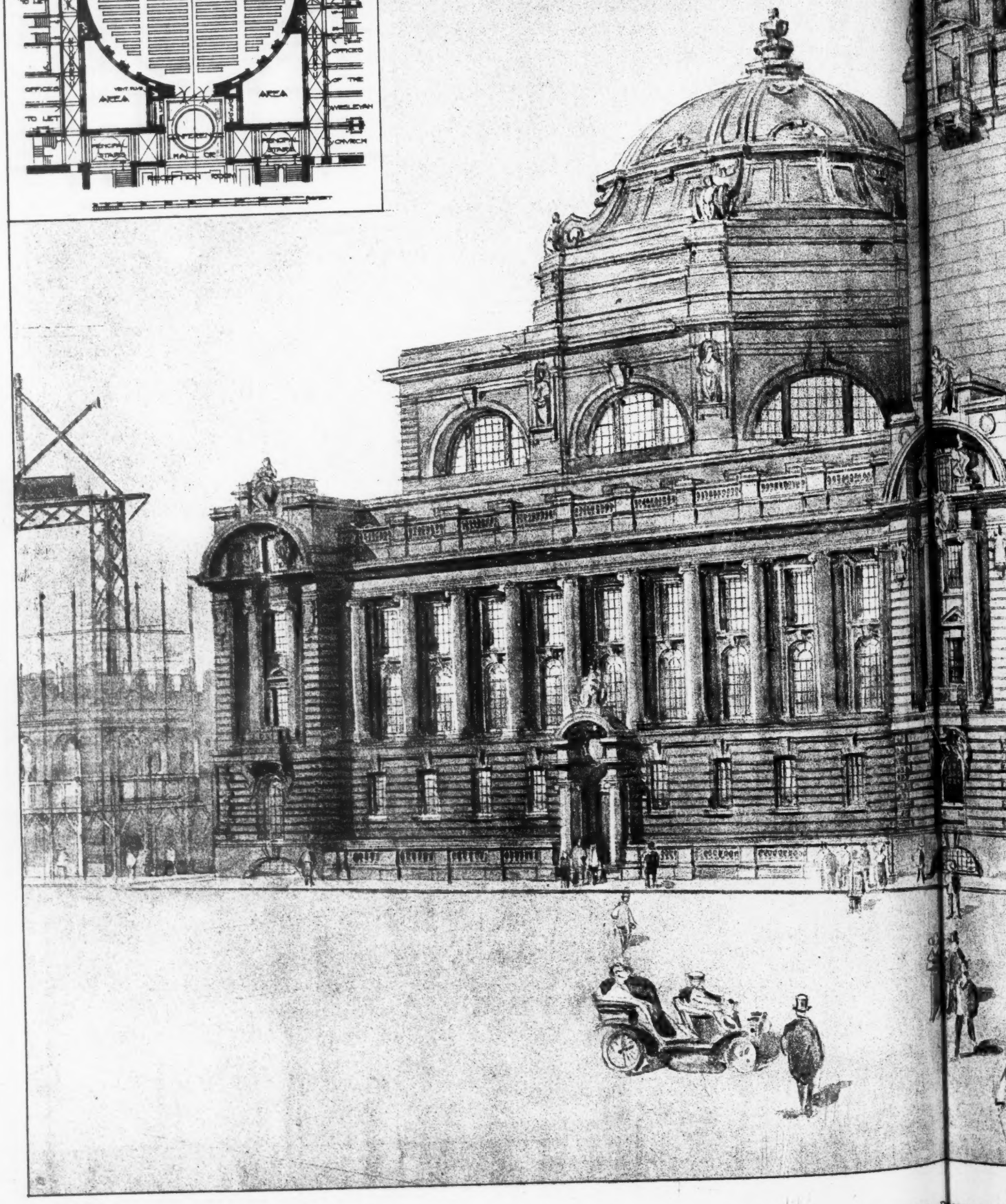

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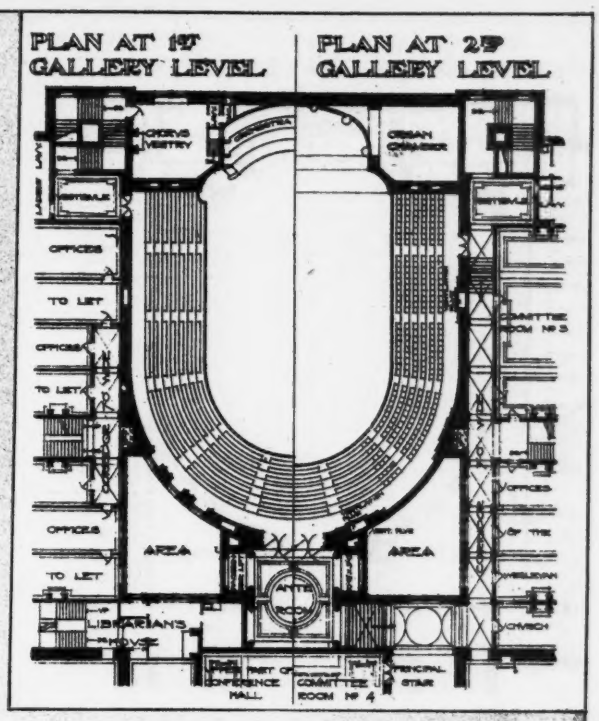

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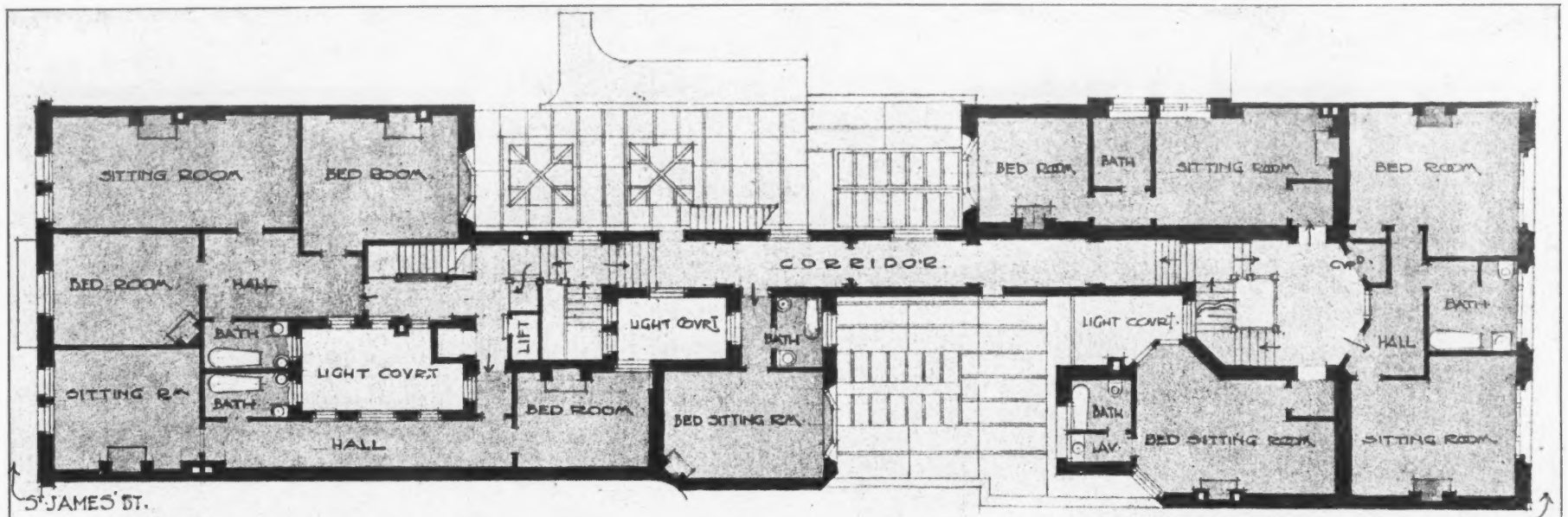
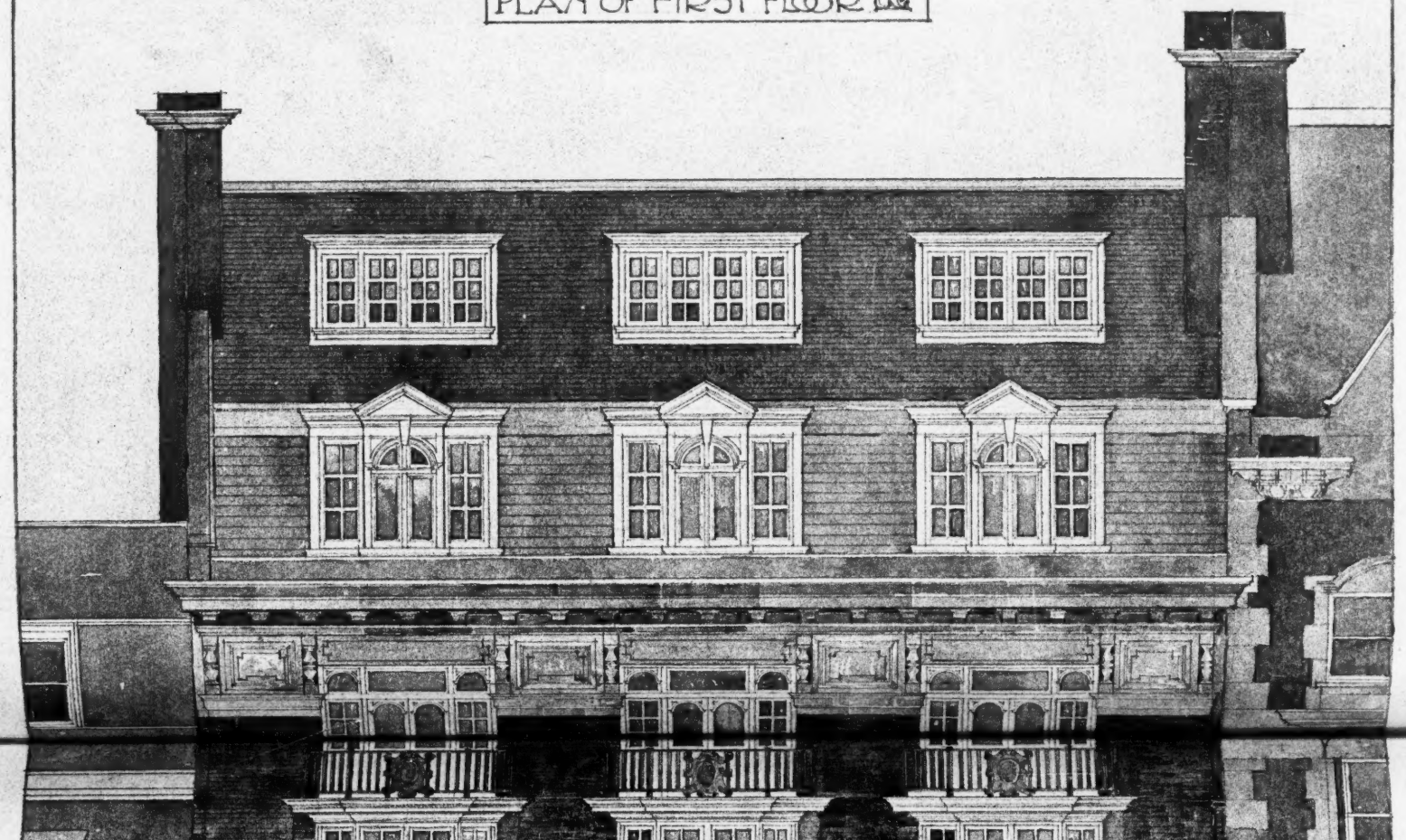
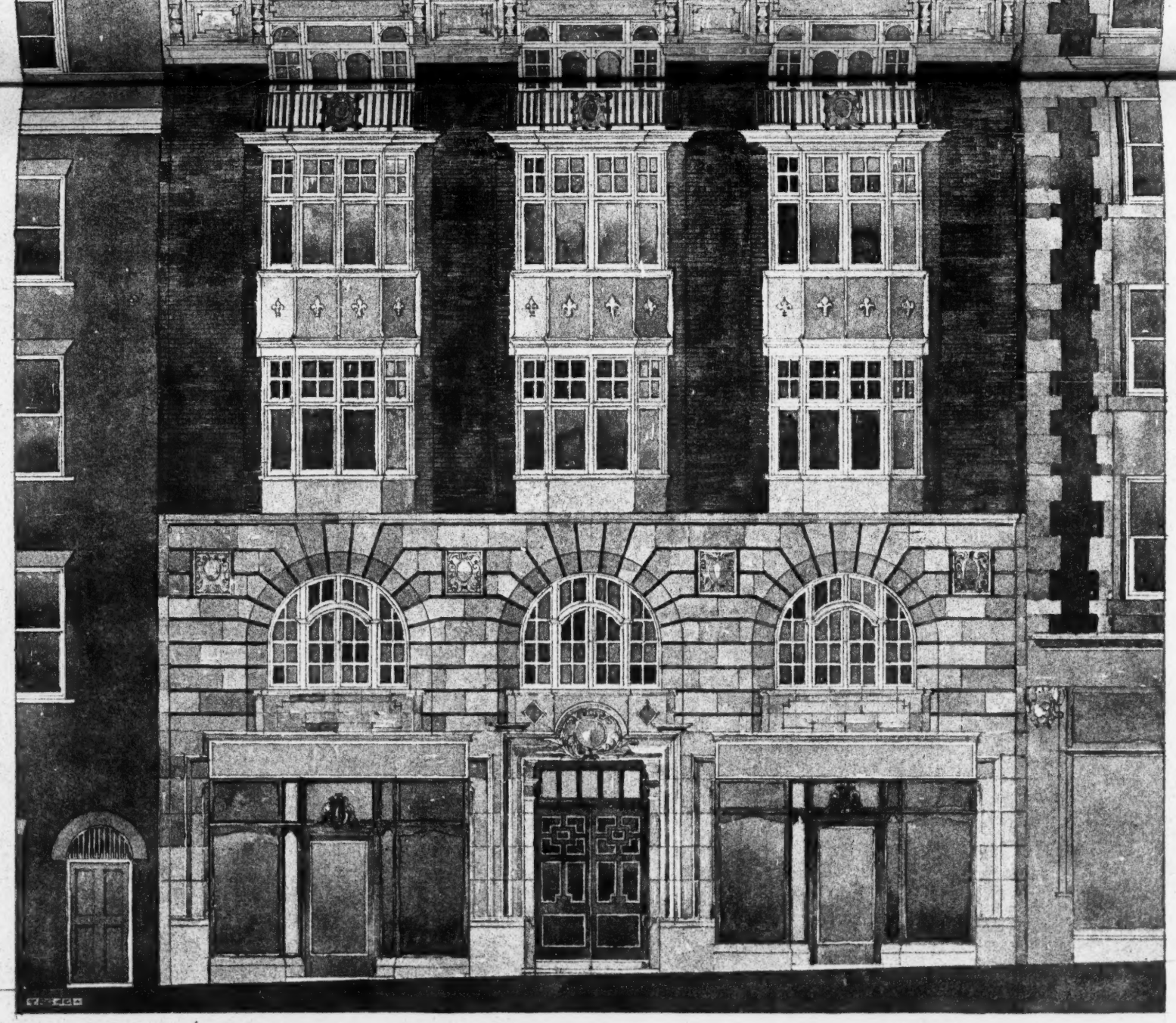


PLAN OF FIRST FLOOR





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